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ECONOMIC INTELLIGENCE REPORT

POLICIES AND CAPABILITIES OF SOVIET CIVIL AVIATION

CIA/RR 144
5 September 1958

CENTRAL INTELLIGENCE AGENCY

OFFICE OF RESEARCH AND REPORTS

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MEMORANDUM:

To all holders of CIA/RR 144 dated 5 September 1958, replace second paragraph from bottom of page 10 beginning with "routes.[36] " and ending "Sino-Soviet Bloc.[37] ".

Detach here

routes. 36/ According to the summer schedule of 1957, Aeroflot now connects a total of 329 cities on a regular basis, an increase of almost 50 percent. The number of foreign cities served by the Soviet airline, however, has grown rather slowly since 1954. Routes outside the USSR now extend to the capitals of 21 foreign nations, 11 of which are out-

S-E-C-R-E-T

ECONOMIC INTELLIGENCE REPORT

POLICIES AND CAPABILITIES OF SOVIET CIVIL AVIATION 1940-60

CIA/RR 144

(ORR Project 43.1961)

CENTRAL INTELLIGENCE AGENCY

Office of Research and Reports

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FOREWORD

The USSR has become cognizant of the significance of civil aviation as an element of national power and prestige and is developing a growing capability to challenge US leadership in this field. The continued expansion of Soviet international air relations, accompanied by a comprehensive program to modernize the Soviet air carrier, Aeroflot, indicates that civil aviation is rapidly becoming another phase of the global competition between the Free World and the Sino-Soviet Bloc. The implications of this fact for security, politics, and economics have been a topic of high interest in the Free World since the flight of a Soviet commercial jet transport to London in early 1956. The subsequent unveiling of four other turbine-powered aircraft confirmed the speculation that, after years of neglect, the Soviet air carrier is being readied for a major role in domestic and international affairs. This report is designed to provide, insofar as available information permits, an over-all appreciation of Soviet civil aviation and of the extent to which its rapid expansion presents a threat to the Free World.

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POLICIES AND CAPABILITIES OF SOVIET CIVIL AVIATION*
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Summary

Few countries of the world have as much incentive to develop an effective commercial air industry as the USSR, which encompasses a vast land area devoid in many parts of adequate surface transportation. Because of the priorities accorded the establishment of a tactical and strategic air force, however, Soviet civil aviation has languished in economic neglect and technical isolation, unable to meet expanding domestic demands, and has been a continuous source of embarrassment to its country. Aeroflot, the state air carrier, has had to depend overwhelmingly on obsolete aircraft and rudimentary ancillary facilities comparable to those of the DC-3 era of more than a decade ago in the US. Improvement programs undertaken since World War II have been interim measures at best. Aircraft which were already obsolete by Free World standards have been replaced by equipment only slightly less inferior. The failure to introduce advanced aids to navigation and modern airport facilities has prevented necessary improvements in technical proficiency. Equally serious, civil aviation is pervaded by the adverse influence of the ponderous bureaucracy which is inherent in the Communist political and economic system. As a result, utilization of aircraft and productivity of labor remain exceedingly low, at levels far below those of US airlines, which in 1956 handled 12 times more traffic than Aeroflot, although in the aggregate they possessed fewer aircraft and only two-thirds the number of workers.

The general liberalization of Soviet foreign policy that followed the death of Stalin, however, has been accompanied by a significant new emphasis on civil aviation. The entire air system is in the first phase of a comprehensive modernization program which is calculated to thrust the USSR to the forefront of world commercial aviation. The requirements of Aeroflot for modern aircraft no longer are being deferred. The Tu-104, a fast jet transport manufactured without regard to efficient operations, was rushed into service during 1956 in a successful effort to enhance Soviet prestige. Other heavy jet and turboprop aircraft, now in the prototype or testing phases of development, are soon to be employed on domestic and international routes. Major Soviet airports are being enlarged, and modern navigation and landing aids are being installed to meet the increased requirements of high-speed aircraft.

* The estimates and conclusions contained in this report represent the best judgment of ORR as of 1 July 1958.

Improvements in equipment and airways already have had a noticeable effect on the performance of Soviet civil aviation, especially passenger traffic, which increased 67 percent in 1957 above the level of the previous year. Although air service in the USSR has not had the major impact on passenger travel that it has had in the US, the trend certainly is in that direction. By 1960 the share of civil air transport in total passenger travel by all modes of conveyance is expected to reach 7.8 percent, or approximately 5 times that of 1955. In spite of the impressive gains anticipated, however, the volume of air transport in the USSR is expected to remain inferior to the traffic performance of US carriers, especially on a per capita basis, although the gap now is narrowing at an accelerated rate. If the planned rate of expansion through 1960 is maintained thereafter, Aeroflot may be carrying more passengers than US airlines by about 1965, but it will not soon surpass its US counterparts in the transportation of air freight. Deficiencies, compounded by the difficulties inherent in a reequipment program for the entire fleet, doubtless will continue to hinder the operational effectiveness of Aeroflot. Nevertheless, there is no reason to believe that Soviet intentions will be completely frustrated, for the demand for air service is being enthusiastically encouraged through extensive advertising and rather drastic fare reductions.

The USSR, with a growing confidence in the ability of Aeroflot to compete with foreign airlines, simultaneously is making strenuous efforts to expand its international air relations with the Free World. Of particular significance is the apparent Soviet intention to transit intermediate territories to the sensitive areas of the Middle East, Africa, Asia, and ultimately Latin America. Some of the many Soviet proposals to enter bilateral air agreements may have been made to exploit the intense competition that characterizes the commercial air industry of the Free World. Moreover, public reiteration of the desire of the USSR for reciprocal air service between Moscow and New York may be designed to discredit the motives of the US in the current attempt to encourage US allies to pursue a common policy in confronting Sino-Soviet Bloc efforts to expand air relations with the Free World. Resentment against the dominant role of US international air carriers makes Western Europe a particularly fertile ground for such a tactic. Superficially, however, negotiations or overtures of the USSR in various parts of the globe reflect a comprehensive international expansion program, calculated in time to place Aeroflot among the leading airlines of the world. Success seems assured if the USSR maintains the current facade of international affability and becomes amenable to the principles of reciprocity prevalent among free societies.

The growth of the Soviet international air network is not based entirely on the desire of the USSR to normalize another aspect of its relations with the Free World, although this impression is being assiduously fostered abroad. It is becoming increasingly evident that Aeroflot also is being developed as a political instrument of the Soviet policy of global competition with the Free World. The US has become accustomed to Soviet efforts to dislodge its long-established influence in civil aviation among nations of the Free World, particularly in the underdeveloped areas, where, through technical assistance and aircraft sales, the USSR has had some success in encouraging respect for and dependence on Soviet technology. Thus far the USSR has been handicapped by the glaring inferiorities of its own civil aviation and by the preeminence of US aircraft manufacturers and airlines. One of the principal impediments to Soviet penetration efforts, however, is rapidly being overcome by the production of modern turbine-engine transports which, superficially at least, compare favorably with those being developed in the Free World. The new Soviet turboprop aircraft, in particular, are likely to be attractive to airlines having a requirement for equipment that is relatively inexpensive to operate, flexible in range, and capable of use from short, unimproved airfields. Consequently, the aircraft manufacturers of the US, the UK, and France soon may be confronted by declining sales in markets which they long have dominated, especially if the USSR chooses to sell at bargain prices.

Soviet air policy, although not basically motivated by economic considerations, nevertheless will involve commercial competition between Aeroflot and airlines of the Free World for passenger traffic. Soviet tactics suggest that the USSR, by virtue of its advantageous geographic position astride the shortest great circle route between Europe and the Far East, intends to establish Aeroflot as a major link between these areas. With competitive aircraft being introduced into service, the only apparent obstacle to be overcome is the exceedingly inadequate service offered by the Soviet air carrier. It must be assumed, however, that Aeroflot eventually will master the art of catering to sophisticated tastes through association with advanced airlines of the Free World. The noticeable improvements already achieved in passenger service and interior aircraft design suggest that the Soviet air carrier will emerge in the near future as a strong contender for international air traffic in Europe and Asia.

I. Civil Air System.

A. Development of Civil Aviation.

1. Early Phases.

Civil aviation in the USSR is almost entirely a Communist product, for there were no air transport developments of consequence during the Tsarist period. 1/* From the time the Bolsheviks seized control of the Russian government in 1917 and began to emphasize the development of an industrial economy, aviation offered a special appeal. In a country encompassing almost one-sixth of the earth's land area the construction of a vast system of dependable pioneer routes became a basic condition for the expansion of state control and the development of both industry and agriculture. The need for a balanced system of defense between the frontier areas of the east and west as well as the necessity for unifying a complex of many nationalities also required an organized system of communications and transportation. An inadequate railroad system, concentrated around the European USSR; the scarcity of motor roads; and the lack of even the rudiments of modern transportation in primitive areas constituted serious obstacles to this development. 2/ Consequently, the new rulers of the USSR were quick to grasp the significance of air transport as a means of implementing their plans and maintaining a firm executive control in vast areas of the country. 3/

Although cognizant of the potential of air transport, the USSR at the outset lacked the technical knowledge and the resources necessary to organize it successfully. As a result, the Soviet government in 1921 unreservedly welcomed the assistance offered by the German Junkers Company, and in November of that year the joint German-Soviet Air Transport Company (Deruluft) was established. 4/ Deruluft supposedly was based on equality of ownership and was to have flight and mechanical staffs composed equally of nationals of each country. During the early stages of operation, however, its personnel consisted almost entirely of Germans, 5/ although over-all control was vested in a Russian manager. 6/ German technicians undertook the creation of the substructure of a primary air network and organized the operation of the first routes. They also constructed and for some time staffed aircraft factories in the USSR. 7/ The services of Deruluft were never very extensive, although they lasted until 1936, when the company was dissolved because of the strained relations between the USSR and Germany. 8/

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Nevertheless, through participation in Deruluft and association with German aviation technology the USSR soon acquired sufficient knowledge of the principles of airline management to conduct its own limited civil air operations. By early 1923 a Council of Civil Aviation had been established to create and manage the operation of the All-Russian Society of the Voluntary Air Fleet (Dobrolet). 9/ Dobrolet was soon followed by the Ukrainian Society of Air Transportation (Ukrvozdukhput') in mid-1923 and the Transcaucasian Aviation Society (Zakavia) in 1924. Each of these organizations was originally formed and operated as a joint stock company, with shares held by the state, cooperatives, and private individuals. During 1924, however, they were placed under the administration of the Air Force (UVVS), with supervisory responsibility resting in the Inspectorate of the Civil Air Fleet (IGVF). 10/ The existence of Zakavia as an independent company lasted only until 1925, when it was absorbed by Ukrvozdukhput'. 11/

A reorganization in 1927 shifted the inspectorate to the Peoples Commissariat of Military and Naval Affairs (Narkomvoyenmore), under which its functions were broadened to include planning, regulation, and direction of all groups engaged in civil air operations. The growing complexity of civil aviation in the USSR,* however, apparently made this arrangement unsatisfactory. In 1929, Ukrvozdukhput' was abolished, and in the following year a new organization, the All-Union Association of the Civil Air Fleet (VOGVF), was created to manage every aspect of Soviet airline operations as well as the construction of civil air facilities. The simultaneous dissolution of Dobrolet concentrated responsibility for all civil aviation in the USSR in VOGVF. 13/ The failure to make VOGVF self-supporting and independent of state subsidies 14/ apparently led in November 1932 to another reorganization, which resulted in the creation of the Main Administration of the Civil Air Fleet (GUGVF). The GUGVF, with minor modifications in its original structure and functions, is still the agency entrusted with the direction of nonmilitary aviation in the USSR.

2. Organization of the Main Administration of the Civil Air Fleet (GUGVF).

Since its inception, control of the GUGVF has reposed in the highest organs of the government. In 1948, following a period of subordination to the Council of Ministers and its predecessors, the GUGVF became attached to the Ministry of the Armed Forces (MVS).

* The total length of civil air routes in the USSR had grown from 1,200 kilometers (km) in 1922 to 31,830 km by 1932. 12/

Some time later* its subordination reverted to the Council of Ministers, where it remains today, along with a limited number of organizations charged with important missions. 16/ The central responsibility of the GUGVF is the direction of all civil air operations in the USSR, both scheduled and special, over which it exercises administrative and legal authority. Its primary task is the operation of the Civil Air Fleet (GVF) under the trade name Aeroflot, but it also supplies transport aircraft and operating personnel to other agencies of the government, such as the Ministry of the Aviation Industry (MAP) and the Ministry of Internal Affairs (MVD). The GUGVF also undertakes international negotiations with foreign countries, including other members of the Sino-Soviet Bloc, for air rights abroad. 17/

To discharge its numerous and varied responsibilities, the GUGVF has a complex organization with headquarters in Moscow. It is advised by a collegium which meets periodically and which probably consists of representatives of various agencies having an interest in civil air service. Administration is handled by several deputies who manage numerous departments and subordinate units dealing with operations and supporting activities. Staffs of the GUGVF cover the fields of finance, planning, and publishing as well as scientific research. 18/ The head of the GUGVF and most of his deputies are always high-ranking officers of the Soviet Air Force, thereby assuring close alignment of its development with the policies of Soviet military establishments, to which control would revert without difficulty in the event of an emergency. Until recently the director was S.F. Zhavoronkov, a Marshal of Aviation, whose association with civil aviation began in 1947. 19/ In January 1957, however, Chief Marshal of Aviation P.F. Zhigarev, former Commander-in-Chief of the Air Force of the Soviet Army, replaced Zhavoronkov, who became deputy director. 20/ Although ill health was given as the official reason for the demotion of Zhavoronkov, he still holds an important position in the GUGVF and allegedly shares certain policymaking functions with Zhigarev, who acts as a chairman of the board. 21/

3. Aeroflot.

Operationally, the Soviet civil air carrier, Aeroflot, corresponds to Free World carriers such as Trans World Airlines of the US or the British Overseas Airways Corporation of the UK. It has, however, a complete monopoly on all Soviet commercial air transport, both domestic and international. In addition to carrying passengers, freight, and mail on scheduled and local flights, Aeroflot is responsible for such

* Possibly in February 1950, when the MVS was separated into the Ministry of War and the Ministry of the Navy, or in March 1953, when these organizations were again merged to form the Ministry of Defense. 15/

agricultural activities as insect control and fertilizer spraying. It also engages in forest surveys, geodetic and cartographic missions, scientific explorations, transportation of medical teams and supplies, and many other specialized activities requiring the service of aircraft. 22/ The various activities of Aeroflot are controlled by the GUGVF through 15 territorial administrations, which are subdivided along boundaries convenient for airline operation, some coincident with political subdivisions of the USSR. 23/ To a large extent, the territorial organizations parallel the structure of the GUGVF. Through such operational entities as the airports, flight workshops, and training and construction units, they control all civil air activities within their respective areas, governed only by goals and standards established centrally by headquarters. 24/

To insure satisfactory performance of personnel and aircraft, there are four other organizations paralleling the administrative structure of Aeroflot -- political staffs, the Communist Party, the trade union, and Komsomol units. The latter two organizations penetrate all administrative levels, down to the smallest work teams. Staff members of political units act as inspectors and propagandists on any subject regarded as having political significance. The Party, with an office or member at virtually every operational level, and Komsomol groups complement the ideological indoctrination of the political staffs and also attempt to uncover infractions of operating practices and regulations. Trade union organs, being wholly under the control of the Party, are not comparable with similar groups organized in free societies to represent and bargain for their members. Their primary function is to solve technical and production problems so that plans may be fulfilled. Some of the activities for which the trade union is considered responsible, along with actual operating personnel, are flight safety, passenger service, materials and labor supply, and labor productivity. 25/

Association with the Soviet military establishment, facilitated by the assignment of high-ranking air force officers to top administrative posts in the GUGVF, is fostered among the lower echelons through the Voluntary Society for Cooperation with the Armed Forces (DOSAAF). Although membership in this organization is not officially compulsory, Aeroflot personnel are under considerable pressure to join. The mission of DOSAAF is to build up aviation among Soviet youth as well as to develop a large reserve of trained flying personnel for use in an emergency. Young men from all walks of life are given preliminary training in every form of aviation, including powered flying, motor and fixed-wing gliding, parachuting, and model airplane building. From this semitrained group the Soviet Air Force and Aeroflot draw a steady stream of recruits. 26/

B. Civil Air Network.

The USSR, encompassing the largest land area in the world, appropriately possesses an extensive civil air system (see the maps, Figure 1* and Figure 2*). The network is conspicuously dominated by Moscow, from which air routes extend to all major cities in the USSR. The heaviest concentrations of scheduled intercity routes lie to the south of the capital and toward the Black and Caspian Seas as well as Kazakhstan. Other main arteries extend westward to Eastern Europe and Scandinavia, all to points within 1,000 km of the Soviet border. One of the most important trunk routes traverses the country from the west to the Far East, connecting all important cities in between. The network of scheduled routes is progressively sparser to the east, as population density decreases. In these relatively remote regions, however, lateral communication is provided by a well-developed system of feeder lines that branch out from provincial centers. 27/

In the initial stages of development, Soviet civil air routes tended to parallel existing surface transportation lines, especially the railroads. A few air routes left the main rail lines in remote areas, although in many instances they stayed close to the rivers and seacoasts. 28/ Nevertheless, the Soviet civil air system has expanded steadily since 1922, when only 1,200 km of air routes were flown. 29/ By 1940 the unduplicated length of air routes had grown to 151,000 km, not including the network of Polar Aviation, which at that time represented 12,000 km in addition. 30/ Civil air routes were almost completely disrupted during World War II, but by 1945 the prewar network was virtually restored. Expansion during the reconstruction period was rapid and evidently unanticipated. The Fourth Five Year Plan (1946-50) provided for an extension of the civil air network to 175,000 km, with primary emphasis to be devoted to developing connections between Moscow and the capitals of the various constituent republics and regional centers. 31/ By 1950, however, the route mileage of Aeroflot had actually reached 310,000 km, or more than twice the length of the air system in 1940. The basic air network of Aeroflot appears to have been established during this postwar period, for its subsequent rate of expansion has been considerably slower. By 1956 the length of Soviet air routes had grown to 347,000 km, an increase of only 12 percent above the level of 1950. The trend in the growth of Soviet civil air routes is shown in Table 1.**

The growth of the Soviet network is also reflected in the increasing number of cities served by air. In 1954, Aeroflot regularly flew between 225 pairs of cities, 12 of them on international

* Following p. 10.
** Table 1 follows on p. 10.

Table 1

Length of the Soviet Civil Air Network a/
Selected Years, 1940-56

Year	Regularly Scheduled Routes b/ (Thousand Kilometers)	Index (1940 = 100)	Total Regularly Scheduled and Feeder Routes (Thousand Kilometers)	Index (1940 = 100)
1940	70 c/	100	151 d/	100
1945	66 e/	94	142 f/	94
1950	147 d/	210	310 d/	205
1955	174 d/	248	337 d/	223
1956	175 d/	250	347 g/	230

a. The length of Soviet air routes is believed to be unduplicated, in the sense that it represents the sum of the one-way flight distances between all cities connected by air.
b. Those routes contained in published schedules.
c. Derived by subtracting 81,000 km, the approximate length of the feeder route system, 32/ from the total length of air routes.
d. Growth indexes 33/ were applied to the 1940 base to derive the length of regularly scheduled routes. [redacted] growth indexes for the total network, which were used in conjunction with 1956 data. 50X1
e. Based on the unvarying relationship of scheduled to total route mileage in 1940 and 1950.
f. 34/
g. 35/

routes. 36/ According to the summer schedule of 1957, Aeroflot now connects a total of 329 cities on a regular basis, an increase of almost 50 percent. The number of foreign cities served by the Soviet airline, however, has grown rather slowly since 1954. Routes outside the USSR now extend to the capitals of 17 foreign nations, all but 6 of them (Helsinki, Copenhagen, Stockholm, Brussels, Belgrade, and Kabul) in other countries of the Sino-Soviet Bloc. 37/

Soviet feeder lines, for which no schedules are available, serve a large number of other cities, on trunk routes as well as on extensions to outlying areas. The scope of local air service in the USSR is indicated by the fact that since 1940 it has consistently accounted for

Figure 1

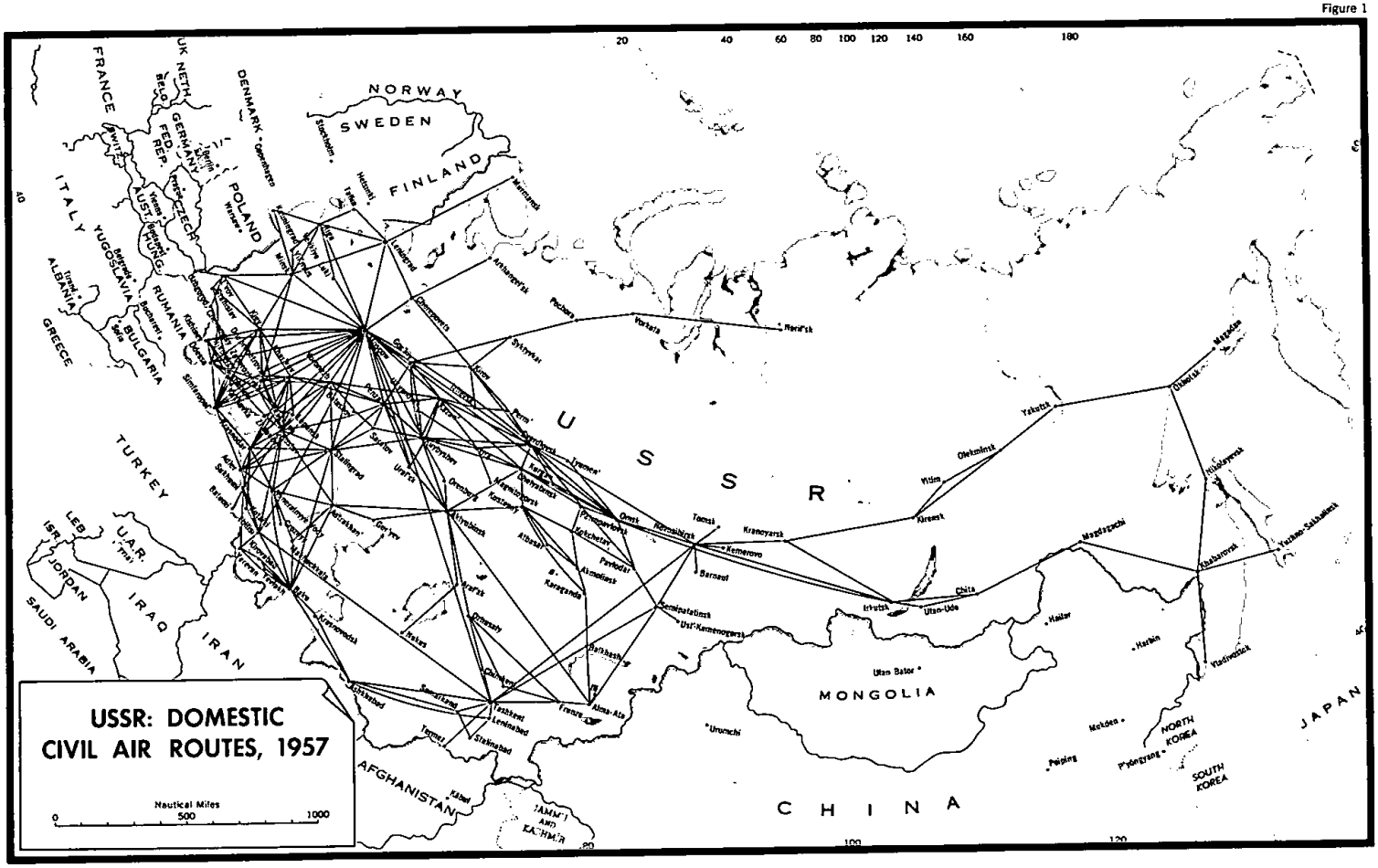

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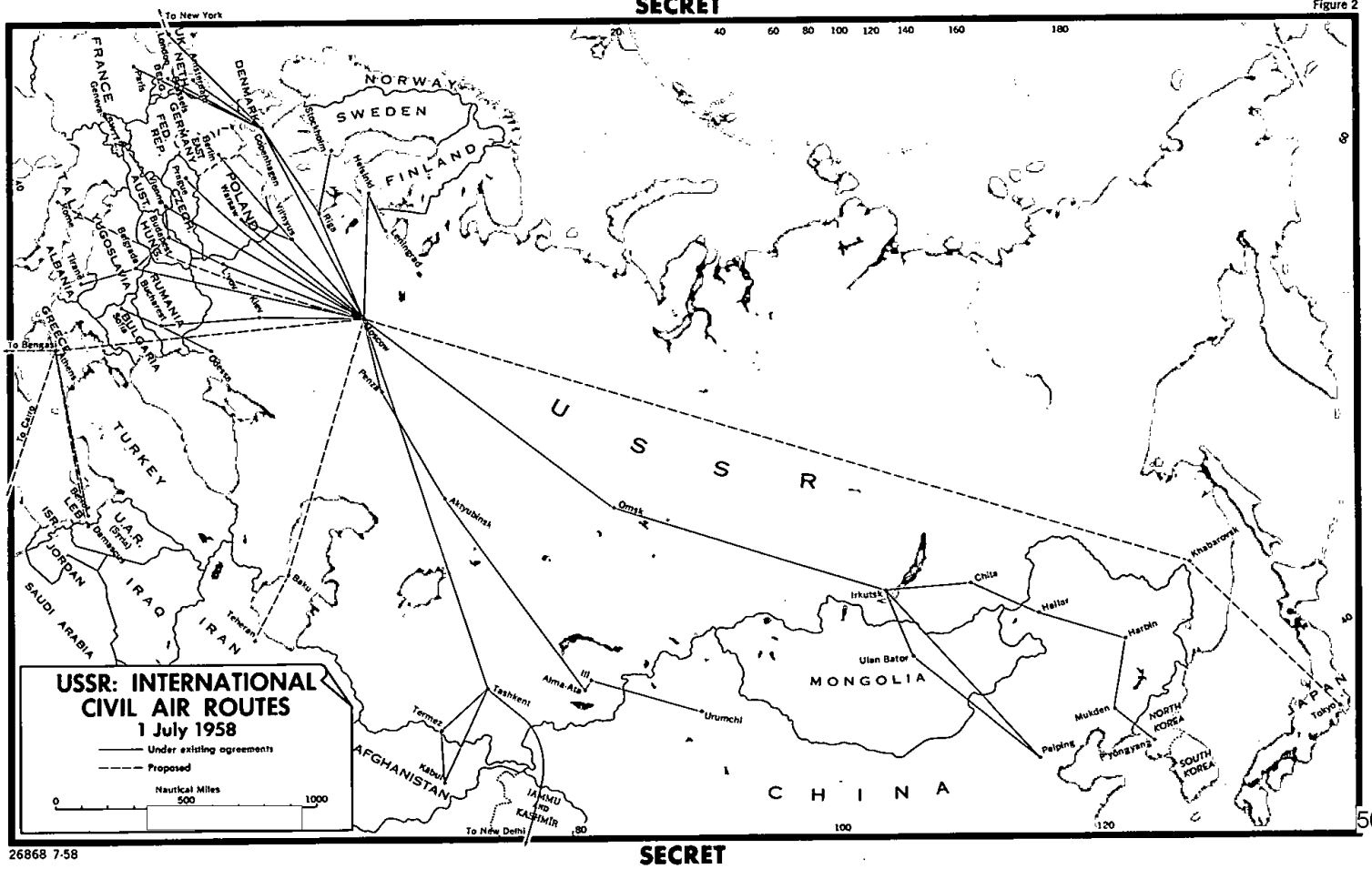
Figure 2



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approximately half of the total length of air routes under jurisdiction of Aeroflot. In 1940, before hostilities began, feeder lines served 81,000 km of local routes, or about 54 percent of the entire air network. The relationship remained fairly stable until 1951, when the scheduled services began expanding at an accelerated rate. By 1955 the feeder lines' share of the total route system had dropped to 48 percent. The subsequent growing demand for local services, particularly in such areas of expanding economic activity as Siberia and the Far East, seems to have reversed this trend. Consequently, although the length of scheduled routes remained virtually unchanged in 1956, about 9,000 km were added to the local network.

Apparently, the length of air route mileage in the USSR now surpasses that of the US, although a precise comparison is impossible because of the differences in the statistical methods of the two countries. On the basis of the figures compiled by the Civil Aeronautics Administration, which include some duplication between carriers, the network of scheduled US domestic and international airlines amounted to 320,000 km in 1956, or about 8 percent less than that of the USSR. 38/ The fact that the USSR encompasses more than twice the territory of the US does make the comparison much less favorable to Aeroflot, at least domestically, because of the considerable difference in the composition of the air routes of each country. On the other hand, approximately 60 percent of the air network of US carriers is accounted for by international routes, while only about 5 percent of the Soviet air system lies outside the USSR. As a result, the density of domestic air routes is only slightly greater in the US. 39/ The most significant difference in the respective civil air systems lies in the relatively greater development of US international routes, which in 1956 were 12 times greater in length than those of the USSR. 40/ This is certainly a striking inferiority for a major world power, but the growing interest of the USSR in increasing its civil aviation relations with foreign countries certainly will narrow the gap and will serve as the major source of network expansion in the future.

C. Civil Aircraft.

The most conspicuous deficiency of the Soviet civil air carrier, Aeroflot, during the postwar period has been the absence of a high-performance, four-engine transport for use on main air routes. In the US and other areas of the Free World the standard twin-engine Douglas DC-3 was regarded as obsolete for trunkline service even before the outbreak of World War II because aircraft of larger size and substantially greater speed were being developed. Consequently, the introduction of four-engine equipment in the US, although delayed by the war, began soon after its close. 41/ Although denied access to aircraft of foreign manufacture, the USSR certainly possessed aeronautical talent capable of producing

similar first-line aircraft. Nevertheless, Soviet civil air transport has had to depend overwhelmingly on twin-engine equipment, even on the long continental hauls from Moscow to the principal Far Eastern centers of Khabarovsk (7,000 km) and Vladivostok (7,650 km). The obsolete aircraft of the civil air fleet even became a source of embarrassment to the USSR in its international relations. Aeroflot officials have had to admit on several occasions that their inability to compete with foreign airlines equipped with more modern aircraft was the principal reason for preventing an extension of Free World air services direct to the USSR. 42/

The observance of two heavy transports, the Cart (Tu-70) and Clam (Il-18),* in the Moscow May Day parade of 1947 suggests that attempts have been made to overcome this inferiority. The four-engine Tu-70, estimated to have accommodations for 72 passengers, was a civil version of the Bull (Tu-4) bomber** with a redesigned fuselage and empennage. The Il-18 appeared to be a larger version of the DC-4. Neither of these aircraft was placed in service, in spite of the publicity that accompanied their appearance, and twin-engine equipment for civil employment continued to be manufactured exclusively. The latest twin-engine model, the Crate (Il-14), was introduced in 1954, a year when the US had 636 four-engine aircraft in domestic and international service. 44/

The failure to develop a four-engine transport for civil employment in the USSR probably can be attributed to the higher priority given to the buildup of the tactical and strategic strength of the Soviet Air Force. 45/ Moreover, competitive forces, which in the US stimulated advances in the development of transportation, did not exist in the USSR to hinder the expansion of Aeroflot with outmoded aircraft. As a result, when the decision was made to improve the civil air fleet, the USSR seems to have determined to make the transition direct to large, turbine-powered aircraft. Only in this manner, it may have been reasoned, could the USSR hope to overcome the lead of the Free World, and especially the US, in civil air transport.

The first product of this decision was the Camel (Tu-104), a fast twin-jet adaptation of the Badger (Tu-16) bomber, which was introduced into schedule service in September 1956. Converted bombers, however, usually do not make efficient transports, and the uneconomical performance that has characterized the Tu-104 in operation could well have been anticipated.

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* The designation Il-18 has since been revived and applied to a new turboprop aircraft (see 1, a, (2), (d), p. 20, below).

** The Tu-4, in turn, was a direct copy of the US B-29 bomber, several of which were confiscated after falling in Soviet territory near the end of World War II. 43/

Continued Soviet dissatisfaction with the Tu-104, coupled with extensive efforts to display the aircraft throughout the world, suggests that it may have been rushed into service to enhance the prestige of the USSR by illustrating Soviet ability to have a jet transport on regular runs before the US. In some areas, especially the underdeveloped parts of the world, the desired implications of this feat have been largely accepted, and the Tu-104 has been heralded as a remarkable Soviet achievement in the Communist - Free World technological race. In counteracting Soviet propaganda among the more sophisticated nations of the Free World, however, it has been unnecessary to point out that US aircraft manufacturers could have placed a civil version of the B-47 medium jet bomber into commercial service 5 years ago if operating efficiency had not been a prime factor in US airline service. 46/

Operating economies apparently were not so impetuously disregarded by the Soviet aircraft industry in the design of the four jet and turboprop transports that have followed the Tu-104. The characteristics of each of these newer aircraft compare favorably with those of their counterparts being developed in the Free World, although the tendency of the Soviet aircraft industry to standardize parts and assemblies extensively may entail small penalties in performance. The primary difference appears to be that the Soviet aircraft have been optimized to considerably shorter ranges and therefore will carry somewhat greater payloads. Otherwise, they reveal no remarkable innovations in either technology or design. This statement is not intended to minimize advances in aircraft development in the USSR. In perspective, however, the significance of the new Soviet transports in the field of civil aviation lies mainly in the vastly increased potential they provide as replacements for existing obsolete equipment. The Cat (An-10), for example, will carry five times as many passengers as the latest model Il-14, and, when speed and range are considered, the difference in potential performance is even greater. The introduction of jet and turboprop equipment will not have nearly as great an impact on air traffic in the US, where airlines have been operating heavy piston-driven transports that can carry 80 to 100 passengers over long ranges. 47/

Consequently, although passenger travel by air in the USSR still is comparable with that in the DC-3 era of almost 15 years ago in the US, the time gap is rapidly being eliminated. Aeroflot plans to completely equip its main air routes with turbine-powered aircraft by 1960. The objective seems rather optimistic, considering the complex operational difficulties involved in such a vast program. Its ultimate achievement appears to be assured, however, by the availability of sufficient plant capacity and by the ability of Soviet designers to make short cuts in production schedules.

1. Types.

a. Fixed-Wing.

(1) Piston-Engine.

With the exception of the small transports in special-purpose and local service, the Soviet civil air carrier, Aeroflot, has employed three varieties of twin-engine, piston-driven aircraft on its domestic and international routes -- the Li-2, the Il-12, and the Il-14. The Li-2, a Soviet-built version of the US Douglas DC-3, has served Aeroflot faithfully since 1938, but it has been considered outmoded even by Soviet standards since World War II. The Il-12 and Il-14 followed in succession, each with some improvements over its predecessor. Neither has proved completely satisfactory in performance, and, in spite of several modifications, they remain inferior to similar aircraft in the US.

(a) Li-2.

The Cab (Li-2), a small twin-engine monoplane, has been in continuous use since 1938, when the USSR began producing the DC-3 under US license. Originally the aircraft was known as the PS-84, but during World War II the design was credited to Lisitsin, and its designation was changed to Li-2. 48/ Serial production of the Li-2 apparently was discontinued in 1953, 49/ but in recent years existing models have been modified several times, especially their instrumentation and cabin equipment. Consequently, there are extant several passenger and freight versions of the Li-2 which differ slightly in characteristics and performance. 50/

Basically, the Li-2 is powered by two M-62 reciprocating engines, each of which provides 985 horsepower (hp) for takeoff. With a normal gross weight of 25,300 pounds, it can carry a payload of 3,300 pounds over a range of 1,175 nautical miles* while cruising at an average speed of 130 knots.** 51/ For Soviet purposes, the Li-2 has been a reliable aircraft, simple to maintain and capable of operating from rough landing strips, which are prevalent in many parts of the USSR. 52/ Its one serious deficiency is a limited loading capacity, which prevents the carriage of more than 15 passengers. 53/ In contrast, the DC-3 has approximately the same dimensions, but it can accommodate up to 32 persons. 54/ The difference in potential performance is quite significant when it is considered that for many years the expansion of Aeroflot was in large part dependent on the Li-2.

* One nautical mile equals 1.85 km, or 1.15 statute miles.
** One knot equals 1.85 km per hour, or 1.15 statute miles per hour.

(b) Il-12.

The first postwar transport flown by Aeroflot was the Ilyushin Coach (Il-12), which, following a trend exhibited in most countries, was produced in the USSR as a DC-3 replacement. It is possible that the introduction of this twin-engine aircraft in scheduled service during 1946 55/ was considered to be an interim measure in anticipation of future transports of greater capacity. In any case, its performance did not meet expectations, and a series of modifications became necessary. Wing failures resulted in some changes in configuration in 1950, and shortly thereafter its maximum gross weight and passenger capacity were reduced. Serial production of the Il-12 was discontinued in 1953, 56/ but further alterations of existing aircraft have been required, some probably as recently as 1956. 57/ Remedial programs apparently have not been entirely successful, for the Il-12 remains aeronautically unstable.

In appearance the Soviet aircraft resembles the US Convair 240, a postwar twin-engine transport that was designed to meet similar requirements. Like its predecessor, however, the Il-12 can accommodate relatively few passengers, in spite of the fact that its gross weight approximates that of the US model. The exceedingly low ratio of payload to gross weight is illustrated by the fact that the Il-12 requires almost 2,000 pounds of aircraft to carry a single passenger, or twice that of the Convair. As the following comparison illustrates, the only relatively favorable characteristic of the Il-12 is its longer range:

Characteristics	Il-12 58/	Convair 240 59/
Gross weight (pounds)	35,500	40,500
Cruising speed (knots)	162	236
Range (nautical miles)	1,335	800
Passenger capacity	18	40

(c) Il-14.

A second Ilyushin transport, the Crate (Il-14), appeared in the USSR in 1954. The Il-14 has the same general appearance as the Il-12 but has more desirable flight characteristics, presumably because the defects encountered in its predecessor have been eliminated. The Il-14 appeared in early use primarily as a transport for official use, 60/ although it soon was being introduced in greater

numbers into scheduled services. 61/ Production of an improved version of the aircraft, designated the Il-14M, began in mid-1956. 62/ The latest model, which has been lengthened by about 3 feet, 63/ is powered by two improved Ash engines, each of which has a takeoff rating of 1,875 hp. Gross weight has been increased slightly to 38,000 pounds, and rearrangement of the passenger cabin has provided accommodations for 24 passengers compared with 18 on the original model. 64/ Maximum range of the Il-14M is approximately 1,550 nautical miles at an estimated cruising speed of approximately 165 knots. 65/ Improvements have also been made in design of landing gear, in flap operation, in heating and ventilation, and in radio equipment. 66/ Apparently, however, these modifications have been accompanied by some undesirable characteristics. Ground maneuverability has been hampered, takeoff distance has increased, and there has been a slight decrease in the rate of climb. Stability and control may also have been somewhat impaired. 67/ Furthermore, comparison of the Il-14 with the later Convair models (the 340 and 440), each of which has a much more favorable ratio of payload to gross weight, 68/ indicates that the Soviet aircraft industry continues to find it difficult to control efficiently the weight of its piston-engine transports.

(2) Turbine-Engine.

Until recently, the only high-performance aircraft to supplement the obsolete fleet of civil air transport in the USSR was the Ilyushin Il-20, an adaptation of the Beagle (Il-28) light jet bomber. The number of Il-20 aircraft employed by Aeroflot, however, has always been limited. Conversion of the bomber for transport use requires the removal of armament as well as the installation of a cargo hold in the bomb bay and therefore is not economically feasible. Moreover, the absence of windows, passenger entrances, and escape hatches prevents employment of the Il-20 for passenger service. 69/ As a result, the primary use of the Il-20 since its introduction in 1955 70/ has been in carrying small quantities of mail and priority freight on long internal routes where speed rather than economy is essential.

Official references to a large turbine-powered civil aircraft in 1955 suggested that the serious requirement of Aeroflot for better equipment would no longer be deferred. On 22 March 1956 the first of the promised new Soviet aircraft, a twin-jet transport designated the Tu-104, was introduced to the Free World in London at the termination of a nonstop flight of 1,360 nautical miles from Moscow. During the first half of 1957 the existence of three new turbine-engine transports, the Tu-110, the An-10, and the Il-18 as well as a tourist version of the Tu-104, was announced by the Soviet press, followed by a public display of the aircraft at Moscow's Vnukovo Airport

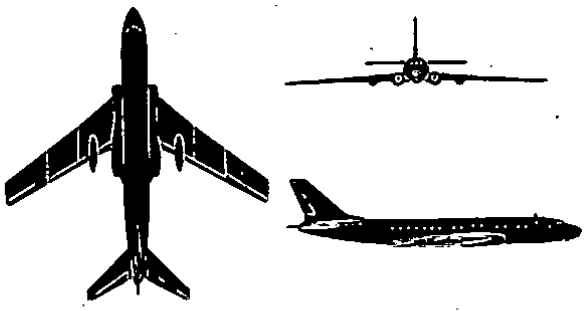
on 8 July 1957. 71/ The Tu-114, another transport of advanced design which had been referred to for some time, was not formally introduced until December 1957. 72/

(a) Tu-104.

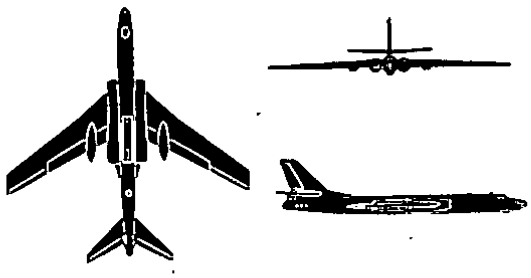
The Soviet aircraft Camel (Tu-104), a graceful, swept-wing transport with twin-jet engines, is a product of the A.N. Tupolev design group. Its pressurized cabin can accommodate 50 passengers, 28 in a main compartment and the remainder in 2 smaller lounges. The powerplants of the Tu-104 were designed by Mikulin 73/ and provide a total thrust of 38,000 pounds for takeoff 74/ with a maximum gross weight of 152,500 pounds. 75/ Cruising at 430 knots, the aircraft can carry a payload of 17,600 pounds 76/ on medium hauls of 1,600 nautical miles 77/ at an altitude of 33,000 feet. 78/

Ever since the Tu-104 passed the development and test phases of its production, propagandists have been diligently extolling Soviet advances in jet-engine technology -- especially in comparison with the nations of the Free World, which will be somewhat later in placing civil jet transports into service. Furthermore, every opportunity has been taken to show the aircraft outside as well as within the Sino-Soviet Bloc. Since its maiden flight outside the USSR to London in early 1956 the Tu-104 has been displayed at the capitals of France, Turkey, Switzerland, Denmark, India, Burma, Indonesia, Czechoslovakia, Rumania, Poland, Bulgaria, and Hungary. 79/ In September 1957 a Tu-104 carrying minor Soviet diplomats to a UN conference landed at McGuire Air Force Base in New Jersey. 80/

The Tu-104 joined Aeroflot for service within the USSR in May 1956 and, after proving flights, was placed into service that same year on 15 September. 81/ Impartial Free World passengers state that the aircraft rides nicely, with little noise or vibration noticeable except in the rear areas. 82/ The Tu-104, however, is basically a civil version of a military aircraft, the Badger (Tu-16) medium-range bomber, as shown in the following silhouettes:



Tu-104



Tu-16

The Tu-104 was developed in the rather short period of 18 months 83/ and has not proved satisfactory in scheduled operation. Although the aircraft is fast and reliable, its range-payload capability is too small for a commercial transport of this size and seriously hampers its profitable employment on civil air routes. Fuel consumption, estimated to be from 9,000 84/ to 10,500 pounds per hour 85/ while cruising, is excessive compared with contemporary jet engines developed for commercial use in the Free World. 86/ Some Free World observers have called the Tu-104 an "economic monstrosity" which in operation would result in an average cost per seat-mile or ton-mile far in excess of that required for profitable operation. 87/ Soviet attempts to correct the technical deficiencies of the Tu-104 indicate that Aeroflot is reluctant to operate at a loss. 88/ The recent admission by Zakharov, a deputy director of Aeroflot, that the jet is costly to operate suggests, however, that problems of economy continue to cause concern. 89/ Attempts to reduce the amount of fuel consumed by the Tu-104 have led to the novel practice of towing the aircraft to the end of the runway for takeoff in order to reduce the use of its voracious engines. 90/

The introduction in mid-1957 of the Tu-104A, a newer version of the Tu-104, appears to have been a more successful means of increasing the economic potential of the basic configuration. 91/ At any rate, operating costs are alleged to have been reduced appreciably 92/ by rearranging the interior to accommodate 70 passengers. 93/ To achieve a higher, although still relatively modest, payload capacity of 19,800 pounds, 94/ the basic model was lengthened 4.5 feet, 95/ and new engines that allegedly consume less fuel and provide a greater takeoff thrust were installed. The improved powerplants, which are credited to the designer P.F. Zubets, 96/ each have an estimated takeoff thrust of 19,800 pounds. 97/ Gross weight, which increased to 163,900 pounds, 98/ was held to a minimum by replacing ornate wooden embellishments and plush upholstery with lightweight seats and fixtures. 99/ Cruising speed and the length of takeoff run at full load are about the same for both the Tu-104 and the Tu-104A, but the latter now requires at least 100 feet in addition to land. 100/

(b) Tu-110.

The Soviet aircraft Cooker (Tu-110), a low-wing aircraft with four turbojet engines, appears to have been developed directly from the Tu-104. The fuselage is slightly longer (129.6 feet), and it has a greater wing span (121.9 feet), 101/ but the configuration and interior finish are virtually the same. The Tu-110, however, has an appreciably greater thrust than the Tu-104. Its powerplants, which were designed by A.M. Lyulka, have a combined

rating of 48,000 pounds. According to Soviet announcements, the Tu-110 will be built in a standard version for 78 passengers and in a tourist variant with accommodations for 100 passengers. 102/ With a takeoff weight of 173,500 pounds, 103/ the standard model will carry a payload of 24,000 pounds over medium-stage routes of 1,850 nautical miles, at a cruising speed of 425 knots. 104/ The range-payload capability of the Tu-110 therefore is somewhat superior to that of its twin-jet predecessor, although its rate of fuel consumption is approximately the same. 105/

(c) An-10.

The Soviet aircraft Cat (An-10), or Ukraina, appears to have been developed from the Camp (An-8), a twin-turboprop assault transport also designed by O.K. Antonov. 106/ It is characterized by a massive circular fuselage with 4 turboprop engines, each of which develops 4,000 hp, installed on an unswept wing. Compared with other new Soviet designs, the An-10 is far less attractive, but its capacious pressurized cabin will seat 84 first-class passengers in 3 compartments, or 126 in the tourist version. 107/ With a gross weight of 112,400 pounds, the An-10 has a maximum payload capacity of 28,700 pounds, which it can carry 1,080 nautical miles. By reducing payload to 18,000 pounds, the range can be increased to about 1,900 nautical miles. 108/ Cruising speed of the An-10 is approximately 325 knots at altitudes of between 26,000 and 33,000 feet. 109/ Passenger accommodations of the An-10 are simple, although special attention has been given to lightweight cabin furnishings. Foam rubber is used in the seats instead of conventional upholstery with metal springs, and plastics as well as lightweight metals are employed throughout the interior. 110/ The An-10 also is said to be a safe aircraft in operation. According to its designers, it can take off on 3 engines and can continue flying after 2 engine failures at altitudes up to 19,700 feet. 111/

Operation into landing strips of dirt and grass evidently was one of the basic considerations in the design of the An-10, for it has low landing and takeoff speeds; large, low-pressure tires fitted on a total of eight wheels in the main gear; and a high-wing configuration to keep the engines well above rough dusty fields. 112/ As a result, the aircraft takes off after a run of only 2,300 to 2,500 feet at full load, and its landing roll is from 1,650 to 2,000 feet. 113/ The An-10 therefore can be employed on most of the domestic routes of Aeroflot without lengthening or paving existing landing strips. It is already being heralded as a potentially invaluable aid in the program to develop the "new lands," where its ability to use unimproved fields will reduce the need to build costly roads which become impassable in winter. 114/ The An-10

will also fill the requirement for a high-performance transport capable of cold-weather operation in the Arctic, where packed-snow runways frequently must be used. 115/

(d) Il-18.

The Soviet aircraft An-10 is reported to be in competition with an aircraft of the Ilyushin design group, the Coot (Il-18), or Moskva, as it is designated by its builders. The two aircraft have much in common. The Il-18 is powered by four turboprop engines, similar to those installed in the An-10, which are mounted on the top side of a low unswept wing. It has been stated, however, that production models of the Il-18 will be equipped with 4,000-hp engines designed by A. Ivchenko. 116/ The fully pressurized cabin of the new aircraft will have accommodations for 75 passengers in the standard version, while the tourist variant will seat 100. With a maximum payload of about 31,000 pounds, 117/ the Il-18 will have a takeoff weight of 128,000 pounds. 118/ The Il-18 is a short- to medium-range aircraft which will cruise 1,080 nautical miles with a full payload or 2,700 nautical miles with a reduced payload of 17,600 pounds. 119/ Cruising speed is between 325 and 350 knots at altitudes of 26,000 to 33,000 feet. Soviet announcements claim that an extremely favorable ratio of useful load to gross weight makes the Il-18 an exceptionally economical aircraft in operation. 120/

The Il-18 apparently has not been based on a military model but seems to have been designed solely as a commercial aircraft, in contrast with the marked military appearances of the Tupolev and Antonov transports. There is, however, some evidence that it is an adaptation of an earlier Soviet model of similar designation that was intended to fill the need for a four-engine civil aircraft. The earlier Il-18, a transport with four reciprocating engines, was first observed in 1947, but for unknown reasons it was never developed beyond the prototype stage. 121/

The Il-18 prototype shown on 10 July 1957 was the first-class version, with cabin furnishings designed to meet Free World tastes, even to such bourgeois embellishments as soft pastel-colored upholstery. 122/ An even more impressive feature of the Il-18, however, is the short distance it requires for landing and takeoff. Its landing roll is stated to be only 1,640 to 1,970 feet, depending on gross weight, while it can take off after a run of only 2,300 to 2,450 feet at full loading under normal conditions. As a result, the Il-18 can be operated into virtually all of the airports on Aeroflot's domestic routes. Its rough-field ability is attributed to low takeoff and landing speeds as well as to a 29.5-foot spread between the main wheels which makes crosswind landings easier. 123/ According to Soviet

announcements, moreover, the Il-18 has been designed so that it can take off without difficulty even if one engine fails. On 3 engines, the aircraft can still reach an altitude of 20,000 to 25,000 feet, and on 2 engines it can continue cruising at altitudes up to 16,500 feet. 124/

(e) Tu-114.

The Soviet aircraft Cleat (Tu-114), known as the Rossiya in the USSR, is another product of the Tupolev design group. In configuration the Tu-114 resembles Tupolev's other recent civil transport models, but, with a length of 155 feet and a span of 177 feet, it is much larger. Moreover, each of the 4 turboprop engines that power the Tu-114 develops 12,000 hp. 125/ The aircraft apparently is an adaptation of the Tupolev Bear, a long-range bomber with four turboprop powerplants. The fuselage of the civil version is naturally very different, but other features of the bomber, including the wings, tail unit, and undercarriage, seem to have been taken over with virtually no modification. 126/ The Tu-114 is easily the largest transport aircraft in the world: for example, it is estimated that, with a gross weight of about 414,000 pounds, the Tu-114 will carry payloads of between 39,700 and 66,000 pounds, depending on the stage lengths flown. Normal range, probably at full loading, is given as 5,400 nautical miles, although a maximum range of 7,800 nautical miles is said to be possible under unspecified conditions. 127/ Cruising speed has been estimated at various magnitudes averaging about 430 knots, 128/ but it is probably as high as 485 knots, the performance cited recently by an official of Aeroflot. 129/

The passenger capacity of the Tu-114 is quite remarkable. The long-range intercontinental version of the aircraft will carry 120 passengers on nonstop flights, such as from Moscow to Vladivostok, Peking, New Delhi, Tokyo, or New York. Another version will carry up to 170 passengers on medium-range flights of unspecified distances, and on short hauls of 700 to 800 nautical miles a high-density model will be able to accommodate 220 persons. 130/ Evidently, the Tu-114 also has the advantage of being able to use relatively short runways. According to its designers, the aircraft can take off from a strip only 3,900 feet long, although under unspecified load conditions. 131/ One innovation of the Tu-114 is its double-deck fuselage. Passenger accommodations are located on the upper deck, and the lower compartments hold cargo, baggage, and a restaurant for 48 people. The aircraft is said to be equipped with 2 elevators 132/ and carries a crew of 10, including 2 pilots, a navigator, a flight engineer, a radio operator, and 3 stewardesses. 133/

(3) Local and Special-Purpose Aircraft.

The Soviet civil air carrier, Aeroflot, is also equipped with several types of smaller transports for use in feeder and special services. The small, rugged Mule (Po-2) is a single-engine, open-cockpit biplane with a top speed of about 85 knots. It has been in continuous service since 1927, first as a trainer and later as the basic aircraft in local service. 134/ The Colt (An-2), a single-engine biplane designed by Antonov, was introduced after World War II as an all-purpose replacement for the Po-2. The basic version of the An-2 can accommodate 8 to 10 passengers or 2,600 pounds of freight. Other models, some especially equipped with pontoons or skis, are employed in crop dusting, ambulance service, and observation. The latest model of the small aircraft subordinate to Aeroflot is the Yak-12, a high-wing, single-engine aircraft which has been produced in several versions. In addition to an agricultural model, there are passenger and ambulance types that can seat 3 passengers, and there is a cargo version that can carry up to 650 pounds of freight. 135/

In response to a requirement for a short-haul aircraft smaller than the An-2 but with a capacity and range considerably greater than the Yak-12 series, Antonov recently designed the An-14, which he designated the Pchelka, or Little Bee. 136/ This small twin-engine aircraft, which is now undergoing flight tests, will have a maximum speed of about 110 knots and will require only 135 to 195 feet for takeoff and landing. According to Soviet announcements, the passenger model of the An-14 will resemble a comfortable seven-passenger sedan and will be so simple in design that it can be operated by any motorist. 137/ As there is no private aircraft market in the USSR, it is not likely that the average Russian will have the opportunity to fly the An-14. The main function of the aircraft probably will be to transport passengers, light freight, and mail in interoblast service. 138/

b. Rotorcraft.

Large-scale air transport in the USSR thus far has been performed only with conventional fixed-wing aircraft, operating from airports which, because of the increasing length of runways, must be far removed from the centers of the urban areas they serve. It has been apparent for some time that the airplane is not the ideal vehicle for short-haul passenger traffic, because of the relatively large amount of time air passengers must spend in traveling at additional expense by surface transportation between their homes or businesses and the airports. For short air journeys of less than a few hundred miles, therefore, it would be desirable to provide low-cost service from the approximate center of a city to an equally

convenient terminal in the city of destination. 139/ Recent developments in the field of rotorcraft in the USSR as well as in the Free World suggest that the helicopter is being considered as a means of achieving this objective.

Development of the helicopter in the USSR apparently was accorded low priority until after World War II, when a coordinated program produced several highly practical models based on the work of such prominent rotorcraft designers as M.L. Mil and N. Kamov. Military aviation has been the primary beneficiary of these advances, but a growing number of helicopters are being integrated into the operations of Aeroflot in the carriage of passengers, freight, and mail. 140/ The Hound (Mi-4), a 10-passenger, single-rotor craft designed by Mil, is probably the main version in civilian use. The Mi-4 closely resembles the US Sikorsky S-55 helicopter in configuration, although it is much larger. Power for the Mi-4 is provided by one Ash-82V engine which develops a maximum of 1,700 hp to lift maximum payloads of 3,525 pounds. 141/ Its range is about 100 nautical miles, and its cruising speed averages 95 knots at altitudes up to 16,000 feet. 142/ The Horse (Yak-24), another large helicopter suitable for civilian use, was shown at the Moscow May Day parade in July 1955. The Yak-24 is a tandem-rotor, twin-engine craft resembling the UK Bristol 173 in appearance but with a much greater payload, 8,800 pounds, and a much greater range, about 435 nautical miles. 143/ Publicity accompanying the display of the Yak-24 indicated it would soon be placed into regular service on domestic routes, 144/ but there is no evidence that the aircraft has ever been employed by Aeroflot. 145/

The most recent and significant Soviet advance in the field of rotorcraft was revealed in an announcement of 30 October 1957 which claimed that a new helicopter, the Hook (Mi-6), had established a new world record by carrying a load of 26,463 pounds to an altitude of 7,870 feet. The Mi-6, another Mil design apparently scaled up from the Mi-4, is a five-bladed, single-rotor craft powered by twin turbine engines which probably develop 4,000 hp each. Allegedly, the military version of this aircraft can accommodate 70 to 80 passengers or can carry such heavy equipment as tractors and bulldozers. By comparison, only about half as many passengers can be carried in the Sikorsky S-56, the largest US helicopter, and the British Westland Westminster, a twin-turbine version of the S-56. 146/

The intended role of the helicopter as a low-cost, short-haul carrier of passengers, freight, and mail on Soviet domestic routes is believed to be reflected in recent statements by the designer of the Mi-6. Mil, who in the past has staunchly supported the use of the helicopter as an all-purpose aircraft, 147/ claims that even now

the demand for helicopter service in the USSR greatly exceeds the capacity of the existing inventory. In the next few years, he predicts, the cost of travel by helicopters, both piston and turbine types, will be comparable to that of short-haul traffic in fixed-wing aircraft. In support of this contention, Mil has estimated that the cost of operating a 16-passenger, turbine-engine helicopter in feeder service would be 2.17 rubles per ton-kilometer (tkm)* and 0.24 rubles per passenger-kilometer (pkm). By comparison, it now costs Aeroflot 4.70 rubles per tkm and 0.59 rubles per pkm to operate its An-2 aircraft, and it costs 3.48 rubles per tkm and 0.33 rubles per pkm to operate the Li-2. 148/ In each case, the cost to transport passengers and freight by helicopter is estimated to be considerably less than the cost by the fixed-wing aircraft currently employed by Aeroflot in short-haul traffic. The increasing use of helicopters on Soviet civil air routes, therefore, can be expected in the future, although they in turn may eventually have to compete with vertical-rising turbine aircraft now under development. 149/

2. Inventory.

Before 1928 the aircraft industry in the USSR was of little significance, and the development of commercial air transport was almost completely dependent on imported aircraft. 150/ The aim of the First Five Year Plan (1928-32) was to make the Soviet aircraft industry independent of foreign assistance, but this goal was not achieved. Further expansion toward self-sufficiency continued during the Second Five Year Plan (1933-37), 151/ so that by 1938 most aircraft in domestic use were products of the Soviet aircraft industry. 152/ Until that year, when the USSR was licensed to manufacture the US Douglas DC-3, production for civil use was limited to small transports such as the Kalinin K-5, a single-engine monoplane with accommodations for 10 passengers. 153/ Reliance on small aircraft became a serious impediment during World War II, when domestic production of the Li-2 had to be supplemented by large imports of US C-47 aircraft, the cargo variant of the DC-3. 154/ A few of these aircraft, refitted with Soviet-made engines and parts, may still be in service in the USSR.

The ability of the Soviet aircraft industry to produce both military and civil aircraft has increased tremendously since World War II, 155/ but, until recently, efforts in the field of civil aviation continued to be devoted mainly to light piston-driven transports. By 1 October 1957, there were 1,520 of these fixed-wing aircraft subordinate to Aeroflot (880 Li-2's, 240 Il-12's, and 400 Il-14's**),

* Tonnages are given in metric tons throughout this report.

** The total inventory and the number of Il-12 aircraft available [redacted] are believed to be accurate. 50X1
The figure of 180 Il-14 aircraft [redacted] /footnote continued on p. 25/ 50X1

in addition to 10 Il-20 twin-jet aircraft which are employed only in carrying priority freight and mail. 157/ A large number -- perhaps 500 to 600 -- single-engine aircraft of the Po-2, An-2, and Yak-12 types are also available for feeder service and for such special uses as spraying and observation. 158/ The use of rotorcraft has not yet become widespread, but it is growing. According to a Soviet announcement, the number of helicopters employed by the civil air fleet in 1956 were to increase by almost 100 percent above the level of the previous year. As of October 1957, however, there were only approximately 35 large helicopters, probably the Mi-4 for the most part, subordinate to Aeroflot. 159/ Modern aircraft of greater capacity have not yet been introduced in very large numbers. It is believed that approximately 50 Tu-104 aircraft have been produced thus far, but probably no more than half of these were in scheduled operation during 1957. Prototypes and possibly some production models of the Tu-110, the An-10, the Il-18, and the Tu-114 were also flown in 1957, but none are known to have been assigned to Aeroflot for other than training purposes. 160/

Excluding single-engine models, the total number of aircraft employed by the Soviet civil air fleet in October 1957 compares very closely with the aggregate inventory of scheduled domestic and international airlines of the US at the beginning of that year. The difference in composition, however, is much more favorable to the US. Soviet aircraft in scheduled service were all twin-engine types, including possibly 25 Tu-104's. US airlines, on the other hand, operated 812 four-engine transports, including 54 turboprop Viscounts, or slightly more than 50 percent of the total aircraft available, as shown in Table 2.*

It is very evident that the Soviet civil air fleet is now in the early phases of a comprehensive and long overdue modernization program which is calculated to close rapidly the gap that now

[redacted] appears to be too low and the Li-2 inventory to be correspondingly overstated. During 1956, there was a substantial acceleration of Il-14 construction in the USSR, which continued in 1957. [redacted] Not all of these were for Aeroflot use; a considerable number doubtless were assigned to military organizations. Although the exact number allocated to Aeroflot is unknown, it is estimated that at least 400 are in scheduled service. The estimated Li-2 inventory of 1,100 [redacted] was reduced by the difference between 180 and 400 Il-14 aircraft to maintain the accepted total inventory.

50X1 50X1 50X1 50X1 50X1

* Table 2 follows on p. 26.

Table 2

Comparison of Soviet and US Civil Aircraft Inventories
by Number and by Type of Engine
1957

Category	Aircraft: Soviet Civil Air Fleet a/ (As of 1 October 1957)	Aircraft: Scheduled US Domestic and International Airlines b/ (As of 1 January 1957)
Twin-engine aircraft		
Piston	1,520 c/	711
Turbine	35 d/	0
Four-engine aircraft		
Piston	0	758
Turbine	0	54
Helicopters	35 e/	20
Total	1,590	1,543

a. Not including 500 to 600 (estimated) single-engine aircraft of the An-2, Po-2, and Yak-12 types employed in local service.
b. 161/
c. 162/
d. 163/. Including 10 Il-20 aircraft used exclusively in nonpassenger operations. It is estimated that 50 Tu-104 aircraft have been produced thus far, but probably only half of these were actually employed in scheduled service during the year.
e. 164/

exists between Soviet and US civil aircraft. Its scope is reflected in the ambitious claim of Zhigarev that by 1960 Aeroflot will be entirely equipped with new turbine-engine aircraft. 165/ On its face, this objective may seem to be completely unrealistic, but it is believed to apply only to the fleet employed on medium- and long-range air routes. It is unlikely that it was intended to include the extensive feeder system which, according to earlier announcements, more logically is to be furnished with the twin-engine aircraft diverted from main routes as replacements for the An-2 and Yak-12 equipment now in general use. 166/

There is considerably more doubt as to the exact types of new aircraft that will be produced in quantity. Soviet officials, including Khrushchev and Tupolev, have stated on several occasions that the Tu-104 would not be produced in volume because of its unsatisfactory performance. 167/ The intention expressed by Khrushchev in November 1956 to manufacture only 25 more aircraft of this type, in view of the development of more efficient transports, suggests that the Tu-104 may have been considered to be an interim type with limited potential. There is also reason to believe that not all of the three medium-range aircraft of competing design will be used extensively by Aeroflot. The Tu-110, in spite of some operational improvements over its Tu-104 predecessor, apparently has not proved suitable for commercial employment. A recent statement by a deputy director of Aeroflot suggests that the Tu-110 will be produced only in limited numbers for the Soviet Air Force, 168/ although earlier it was intended to employ the aircraft on main domestic and international routes. 169/ It has also been implied that the Il-18 is considered more suitable than the bulky An-10 for medium-range operations. 170/ One reason for favoring the Il-18 may be its greater efficiency: according to the aircraft designers, its operating costs are lower than those of any other Soviet aircraft, including the newer types, and consequently its earning potential is higher. 171/

The rate of progress implied in the statement by Zhigarev may also be subject to doubt. Conversion from small piston-engine transports to large new complex types by a large part of the civil air system within the next 3 years will be a formidable task that will certainly entail many problems in training, scheduling, and maintenance. Moreover, there apparently have been revisions in the production schedules of some of the new aircraft. In July 1957 it was reported that the An-10 would soon be placed in service, evidently that autumn. Delivery of 4 of the new aircraft had already been taken by Aeroflot for use in crew training, 172/ and 6 more were to be delivered by the end of 1957. 173/ This timing, however, may have been subsequently disrupted by an unforeseen problem in the design of the aircraft. In October 1957 an An-10 was observed with an oval-shaped vertical extension added to the outer edges of the horizontal stabilizer. 174/ Although it is not certain, a tail modification of this type could indicate that the aircraft is experiencing difficulties in lateral stability. If sufficiently serious, redesign of the entire tail section may be required, thus delaying the introduction of the An-10 into scheduled service. 175/

The Il-18 seems to have been on a production schedule similar to that of the An-10. According to early announcements, proving flights on domestic routes were to begin in September 1957, 176/

but the first experimental flight was reported to have occurred in January 1958. 177/ Recent statements of Aeroflot officials, however, suggest that the Il-18 will precede the An-10 into operation, but both will be in scheduled service during 1958. The status of the Tu-114 cannot be determined with precision. Although it is suspected that the aircraft has been flying for some time, possibly since March 1957, 178/ apparently it is still in the testing phase of development. 179/ Consequently, it is believed that the Tu-114 is probably a minimum of 4 months behind the Il-18 and the An-10 in regard to availability for service 180/ and will not be assigned to Aeroflot until late 1958 or early 1959.

Although the intention completely to equip the main routes with modern aircraft by 1960 may be overly ambitious, there is no reason to believe that this objective will not ultimately be realized. The facilities of the Soviet aircraft industry now devoted to building transport equipment are extensive and for the most part are operating far below capacity. 181/ Moreover, the Soviet aircraft industry evidently is following a policy of simplicity and standardization in the design of transport equipment, thus conserving production buildup time and permitting faster delivery of aircraft. When a particular part of an older aircraft is adequate, although it does not necessarily render optimum service, it is carried over to new models to eliminate extensive redesign. The Tu-104, for example, was developed in the rather short period of 18 months, 182/ largely by relying on the same production methods and structural details as the Tu-16 bomber. 183/ Similarly, the An-10, which reportedly was developed in 14 months, 184/ makes extensive use of assemblies, parts, and equipment of aircraft already in production. 185/ This method may entail small penalties in performance, but it permits standardization of parts and tooling as well as the achievement of lower production costs. The Soviet aim evidently is to get into quantity production robust, efficient transports rather than to provide highly refined aircraft equal in all respects to those being developed to more optimum performance requirements in the Free World.

D. Performance.

Soviet civil aviation, virtually isolated from the advances that have characterized the commercial air industry in the Free World since World War II, has been remarkable until very recently only for its limited progress. Notable and apparently unanticipated gains, however, were achieved in 1957, the first full year of scheduled operation of the Tu-104. Even greater advances are predicted for the future. By 1960, stimulated by the introduction of other modern aircraft of higher performance, the volume of air service provided

by Aeroflot (as measured in cumulated ton-kilometers*) is expected to be 6.6 times as great as the level of 1955. Passenger traffic, long neglected because of the relatively large requirements of industrial expansion for air freight, is growing at a particularly rapid rate. In the next 3 years alone, the number of travelers on domestic and international air routes is expected to quadruple, a significant indication of the severe restrictions heretofore imposed on air travel by the employment of obsolete aircraft.

Air service in the USSR has not had the major impact on passenger travel by common carrier that it has had in the US, although the trend certainly is in that direction. The share of Aeroflot in total passenger traffic by all types of transport rose from 0.2 percent in 1940 to 1.8 percent in 1956, a rise of only 1.6 percentage points in 16 years. At the end of the same period the scheduled airlines' share of domestic intercity passenger travel by common carrier in the US had grown to 35.9 percent.** 186/ Substantial gains made in 1957, when the relative proportion of Soviet civil air passenger traffic increased to 2.6 percent, suggest that the competitive position of Aeroflot is improving rapidly. By 1960, if present plans are achieved, civil air transport will account for about 7.8 percent of total Soviet passenger travel. It is apparent that most of these advances are being made at the expense of the railroads, whose relatively dominant position is also being challenged by the expanding motor carrier service. Sharp inroads are anticipated on long-haul rail traffic in particular. Aeroflot officials point out that, on extended lines such as the Moscow-Vladivostok route, one of the larger new aircraft can transport as many passengers in a given period of time as could 8 to 10 passenger trains. 187/ The changing position of the various types of passenger transport in the USSR is illustrated in Table 3.***

The aggregate volume of Soviet air traffic also continues to be rather small in comparison with the performance of scheduled US airlines. Between 1940 and 1956, for example, the cumulated ton-kilometer performance of Aeroflot declined from 11.6 to 8.3 percent of air carrier performance in the US. In terms of volume of air transport per capita (a more significant measure of the extent to which the service meets the demands of an economy), the disparity

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* Passenger-kilometers plus freight and mail ton-kilometers.

** The difference in the respective shares of Soviet and US airlines in domestic passenger travel is not quite as great as suggested by the comparison. Unlike US figures, Soviet statistics on rail and highway transport include an unknown quantity of commutation traffic, which inflates the relative positions of these two types of transport in intercity passenger movement.

*** Table 3 follows on p. 30.

Table 3

Distribution of Soviet Passenger Traffic, by Type of Transport a/
Selected Years, 1940-60

	Percent of Total Passenger-Kilometers						
Type of Transport	1940	1945	1950	1955	1956	1957	1960
Railroads b/	92.2	94.4	89.5	83.1	80.6	75.9 c/	66.8 c/
Highways b/	3.2	0.7	5.3	12.3	14.9	19.0 c/	23.3 c/
Inland waterways	3.6	3.3	2.7	2.1	1.9	1.8 c/	1.5 c/
Merchant marine	0.8	0.9	1.3	0.9	0.8	0.7 c/	0.6 c/
Civil aviation	0.2	0.7	1.2	1.6	1.8	2.6 d/	7.8 d/
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

[redacted] 50X1

b. Including commutation traffic. 50X1

c. Data for absolute passenger-kilometer performance [redacted] 50X1
[redacted] are used as the basis for the 1957 and 1960 data here.

d. Based on data for absolute passenger-kilometer performance of civil aviation, given in Table 5, p. 34, below), and of all types of transport [redacted] 50X1

is even greater because of the larger population in the USSR. Between 1940 and 1956 the per capita volume of air transport in the USSR rose from about 1 to 19 cumulated tkm. On the other hand, the service provided by US carriers in this period expanded from 14 to 269 cumulated tkm per person, or approximately 14 times the per capita volume in the USSR in 1956. In spite of the impressive gains anticipated by Soviet planners through 1960, moreover, the volume of air transport in the USSR will remain inferior to the traffic performance of US air carriers, although the gap is now narrowing at a rapid rate. By 1960 the volume of cumulated ton-kilometers performed by Aeroflot is expected to reach 102 per person, or approximately 22 percent of the anticipated per capita performance of US airlines in that year. In absolute terms, however, Aeroflot may catch up with US air passenger travel by about 1965 if the expected trend in the relative rates of growth of the air carriers in each country between 1957 and 1960 is maintained beyond that period, but it is not likely to surpass US airlines in air freight in the near future. Performance trends of the civil air fleets of the USSR and the US are shown in Table 4.*

* Table 4 follows on p. 31.

Table 4

Comparison of Soviet and US Civil Air Transport Performance
Selected Years, 1940-60

Year	Soviet Civil Air Fleet a/*		Scheduled US Domestic and International Airlines b/		Soviet Cumulated Ton-Kilometers as a Percent of US Performance
	Cumulated Ton-Kilometers c/ (Million)	Per Capita Volume d/ (Cumulated Ton-Kilometers per Year)	Cumulated Ton-Kilometers c/ (Million)	Per Capita Volume d/ (Cumulated Ton-Kilometers per Year)	
1940	217	1 e/	1,874	14 f/	11.6
1945	600	N.A.	6,280	45	9.5
1950	1,434	8	16,931	111	8.5
1951	1,910	10	21,750	141	8.8
1952	2,095	11	25,644	163	8.2
1953	2,523	13	29,856	187	8.4
1954	2,904	15	33,712	208	8.6
1955	3,296	17	39,853	241	8.3
1956	3,770	19 e/	45,196	269	8.3
1957	5,342	26	51,488 g/	303 h/	10.3

* Footnotes for Table 4 follow on p. 32.

Table 4

Comparison of Soviet and US Civil Air Transport Performance
Selected Years, 1940-60
(Continued)

	Soviet Civil Air Fleet a/		Scheduled US Domestic and International Airlines b/		
Year	Cumulated Ton-Kilometers c/ (Million)	Per Capita Volume d/ (Cumulated Ton-Kilometers per Year)	Cumulated Ton-Kilometers c/ (Million)	Per Capita Volume d/ (Cumulated Ton-Kilometers per Year)	Soviet Cumulated Ton-Kilometers as a Percent of US Performance
1960	21,792	102	80,500 i/	452 f/	27.1

a. Passenger-kilometer data are from Table 5 (p. 34, below), and freight and mail ton-kilometer data are from Table 6 (p. 40, below).

b. [redacted] freight and mail ton-kilometers performed by all-cargo carriers in 1940, which were projected backward from the trend shown during later years. 50X1

c. Passenger-kilometers plus freight and mail ton-kilometers.

[redacted] 50X1

i. Excluding mail traffic. Passenger-kilometer performance is based on expected passenger travel 197/ multiplied by an average length of haul projected from 1952-57. [redacted] 50X1

[redacted] 50X1

1. Passenger Traffic.

The number of passengers carried by the Soviet civil air fleet has increased steadily since the establishment of commercial air operations in late 1921. Advances were naturally slow in the early stages of operation,* but in mid-1930, coincident with the development of a domestic aircraft industry, the rate of growth accelerated. In 1937 the civil air fleet carried 211,000 passengers, a number approximately equal to the aggregate number transported during the first 13 years of its existence. A rapid rate of growth was maintained until 1940, 200/ when the advent of World War II made it necessary to employ virtually all civil aircraft for military purposes. 201/

The development of passenger traffic resumed rather slowly after the war, when reconstruction of surface transportation facilities and of the industrial sector of the Soviet economy received priority. In 1945, with civil air operations probably still limited by military requirements, passenger traffic was only 53 percent greater than in 1940. The sizable relative increase in this index in 1941 to 268 percent above the level of 1940 indicates that civil air operations had returned to normal by 1946. During the Fourth Five Year Plan (1946-50), however, traffic increased by only 6.8 percent, from 1.3 to 1.4 million passengers. Air travel advanced at a greater rate during the Fifth Five Year Plan (1951-55), especially in the later years. By 1955, traffic on domestic and international routes had reached 2.6 million passengers, a number about 7 times greater than the number carried by air in 1940. The relatively greater rate of progress achieved in recent years is illustrated by the fact that Aeroflot experienced an average increase of 240,000 passengers annually during the entire Fifth Five Year Plan period compared with an annual average growth of 172,000 passengers in the preceding plan period. The increasing demand for air passenger service in the USSR since 1940 is shown in Table 5.**

Passenger traffic on international air routes, although only a small part of the total, has become relatively more important since the latter part of the Fifth Five Year Plan, as the USSR expanded its international air relations. In 1955, for example, the rate of increase in passenger traffic on routes outside the USSR was almost four times greater than that of domestic lines. Efforts of the USSR to increase its contacts with the Free World have also led to additional foreign travel on domestic routes, which was 100 percent greater in 1955 than in the previous year. Tourists,***

* Between 1922 and 1934 a cumulative total of 215,700 passengers was carried on Soviet civil air routes. 199/

** Table 5 follows on p. 34.

*** Continued on p. 36.

Table 5

Passenger Traffic of the Soviet Civil Air Fleet
Selected Years, 1940-60

Year	Passengers Carried (Thousand)	Average Length of Passenger Trip a/* (Kilometers)	Passenger-Kilometers Performed (Million)	Index (1940 = 100) Passengers Carried	Average Length of Haul	Passenger-Kilometers
1940	359 b/	504	181 c/	100	100	100
1945	549 d/	911	500 d/	153 e/	181	276 e/
1946	1,320 d/	773	1,020 d/	368 e/	153	566 e/
1947	1,340 f/	798	1,070 f/	373	158	591
1948	1,360 f/	824	1,120 f/	379	163	619
1949	1,390 f/	842	1,170 f/	387	167	646
1950	1,410 d/	865	1,220 d/	392 e/	173	674 e/
Average annual increase, 1946-50	172		144			
1951	1,580 d/	1,006	1,590 d/	441 e/	200	880 e/
1952	1,680 d/	1,048	1,760 d/	468 e/	208	971 e/
1953	1,960 d/	1,107	2,170 d/	547 e/	220	1,200 e/
1954	2,270 d/	1,110	2,520 d/	632 e/	220	1,393 e/
1955	2,610 d/	1,111	2,900 d/	728 e/	220	1,600 e/
Average annual increase, 1951-55	240		336			
1956	3,140 d/	1,038	3,260 d/	876 e/	206	1,800 e/
1957	5,250 g/	907	4,760 h/	1,462	180	2,630
1958	6,700 i/	1,000 j/	6,700 j/	1,866	198	3,702
1960	21,000 k/	1,000 j/	21,000 j/	5,850	198	11,602
Average annual increase, 1956-60	3,680		3,620			

* Footnotes for Table 5 follow on p. 35.

Table 5

Passenger Traffic of the Soviet Civil Air Fleet
Selected Years, 1940-60
(Continued)

a. Unless otherwise indicated, these figures were derived by dividing passenger-kilometers performed by passengers carried.
b. 202/
c. 203/
d. Derived by applying indexes to base year figures. All data are rounded to three significant digits.
e. 204/
f. This estimate is based on a straight-line projection between 1946 and 1950, which is believed to be fairly accurate considering the small aggregate increase in passengers carried and in passenger-kilometers during the entire Fourth Five Year Plan.
g. Passenger traffic in 1957 increased 67.2 percent above the level of 1956. 205/
h. During the first half of 1957 the ratio of the increase in passengers carried to the growth of passenger-kilometers was 0.685, 206/ indicating a substantially faster rate of growth of the former. This ratio was applied to the total increase of 67.2 percent in passengers carried in 1957, and the resultant product of 46 percent was assumed to be the increase in passenger-kilometers in 1957 above the level of 1956.
i. The planned increase in passenger traffic for 1958 was 27.6 percent above the level of 1957. 207/
j. It is believed that the average length of passenger trip will not continue the downward trend shown in 1956-57 but will increase with the advent of longer range aircraft. No basis exists for predicting the extent of the increase, so a round figure of 1,000 km was assumed for 1958 and 1960. Passenger-kilometers were arrived at by multiplying the number of passengers carried by the assumed average length of passenger trip.
k. The director of Aeroflot is reported to have stated that passenger traffic is expected to "almost quadruple" during 1958-60. 208/

originating in about 58 foreign countries, apparently account for the major part of growing foreign travel by air in the USSR. 209/

Until 1953, passenger-kilometers -- the volume of passenger service performed by Aeroflot -- increased more rapidly than the number of passengers carried, because of the growing length of the average passenger trip. Accompanying the extension of domestic air routes, the average length of passenger trip rose from 504 km in 1940 to 1,107 km by 1953, where it leveled off until 1956. As a result, although the number of passengers carried in 1955 was almost 7.3 times greater than in 1940, passenger-kilometers increased 16 times in the same period.

The introduction of the Tu-104 into scheduled domestic and international service in the latter part of 1956 is reflected in gains in passenger traffic during the first 2 years of the original Sixth Five Year Plan (1956-60). In 1956 the number of passengers carried by Aeroflot was 20 percent greater than in 1955. In 1957, traffic rose to over 5.2 million passengers, an increase of 67 percent above the level of the previous year 210/ -- that is, 3 times greater than the anticipated rate of growth.* The employment of the Tu-104 on routes outside the USSR, moreover, facilitated a 42.4-percent growth in international passenger traffic in 1956 above the level of 1955. The significant and evidently unexpected impact of the new aircraft on the operations of Aeroflot is perhaps best illustrated by the fact that, during the first 9 months of 1957, passenger traffic on domestic and international routes increased 69 percent above the level of a similar period in 1956, just before the scheduled employment of the Tu-104. 211/

Contrary to the trend of previous years, passenger-kilometer performance rose at a considerably slower rate during 1956 because of the unexplained drop in the average length of passenger trip to 1,038 km. Consequently, the planned volume of passenger service in 1956 was underfulfilled by 10.4 percent, 212/ although passenger-kilometer performance increased 12.4 percent above the level of the previous year. A further reduction in the average length of passenger trip to about 907 km is believed to have occurred in 1957, which again may have been sufficiently serious to cause the failure to achieve planned increases in passenger-kilometers.

The prospective introduction of other advanced types of aircraft of higher performance is expected eventually to have an even greater impact on passenger traffic. The original Sixth Five Year

* The announced plan for 1957 provided for a minimum increase of 20 percent in passenger traffic.

Plan, which apparently did not fully anticipate the effect of the new jet and turboprop aircraft, set the level of passenger traffic to be achieved in 1960 as 3.8 times that of 1955. This ambitious goal, however, has recently been revised, and the demand for passenger service, according to the director of Aeroflot, is now expected to "almost quadruple" in the next 3 years. 213/ The attainment of this aim, which at present must be considered rather tentative, will bring traffic in 1960 to about 21 million passengers, or 8 times the level of 1955. The remarkable rate of growth envisioned is illustrated by the fact that the average annual increase in the 1956-60 Plan period will be more than 15 times greater than during the preceding Five Year Plan, which in turn was only 1.4 times more than the average annual increment during 1946-50.

Recent Soviet achievements in civil air passenger traffic, although very substantial, continue to be inferior to the performance of US air carriers. The absolute difference in the amount of air travel in the USSR and the US, as shown in Figure 3,* has been widening at a rapid rate since 1940, when Aeroflot carried 359,000 passengers, or approximately 13 percent of the number transported by US airlines. The recovery of civil aviation in the USSR after World War II was not so rapid as in the US, so that by 1951, when US carriers transported about 23.1 million more passengers than Aeroflot, Soviet air passenger travel as a percent of US traffic had dropped to 6.5 percent. Thereafter the comparative rates of growth of air passenger traffic in the USSR and in the US leveled off, and the percentage relationship remained fairly stable through most of 1956. The trend was similar for Soviet passenger-kilometer performance, which varied only from 7.0 to 7.5 percent of the performance of US carriers between 1951 and 1956. The somewhat greater ratio of passenger-kilometers performed than of passengers carried is caused by the fact that the average length of passenger trip in the USSR was about 150 km longer than in the US during those years.

The difference in the levels of civil air traffic carried by Aeroflot and by US carriers is also reflected in airport activity, which is considerably lower in the USSR in spite of increases in traffic during recent years. The number of passengers arriving and

* Following p. 38.

[redacted] 50X1

[redacted] 50X1

[redacted] passenger-kilometers in 1960 50X1

were derived by multiplying passengers carried by an average length of haul estimated on the basis of the upward trend experienced during 1952-57. Data on the operations of Aeroflot were taken from Table 5, p. 34, above.

departing the airport at Vnukovo, which serves Moscow (population more than 7 million), 217/ rose from 365,000 in 1945 218/ to 500,000 in 1956. 219/ Khabarovsk, which probably ranks as the second most active airport in the USSR, 220/ had a turnover of 73,000 passengers in 1952. 221/ Aircraft movements in and out of Vnukovo in the summer periods when traffic is at a peak average about 220 daily. 222/ In comparison, during 1956, Washington National Airport, which serves a population one-fifth the size of Moscow, had a turnover of more than 3.9 million passengers, or 7.8 times as many as Vnukovo. The average of 594 commercial aircraft arriving and departing the National Airport daily in 1956 was 2.7 times the peak aircraft movement at Vnukovo in the same year. 223/

The pace of Soviet civil air activity has quickened noticeably since the latter part of 1956. As a result of the accelerated rate of growth that accompanied the introduction of the Tu-104, the performance of Aeroflot rose to 10.6 percent of total air passenger traffic in the US in 1957. The volume of air service provided by the Soviet carrier increased at a somewhat smaller rate because of another rather sizable decrease in the average length of haul in 1957. As a result, the passenger-kilometer performance of Aeroflot was only 9.3 percent of that of US carriers. Passenger arrivals and departures at Vnukovo are also growing at a rapid rate and probably totaled 625,000 to 650,000 in 1957, an increase of about 25 percent above the level of the previous year.* 225/ Consequently, civil air passenger traffic in the USSR is now growing at a substantially greater rate than in the US, as shown in the accompanying chart (Figure 4**). By the end of 1960, civil air travel in the USSR may stand at approximately 15 times the level of 1950. Forecasts of the demand for air service in the US indicate a growth by 1960 to 3.8 times the level of 1950. It is apparent, therefore, that Aeroflot is at a stage of development comparable to that experienced in the US immediately after World War II, when US air carriers began taking delivery of four-engine equipment. The superiority in performance of these aircraft over their DC-3 predecessors permitted US airlines almost to triple the number of passengers carried between 1945 and 1950. 227/ This rate is considerably less than the anticipated rate of expansion of Aeroflot with heavier equipment, but the level of traffic on which the comparison is based was three times higher in the US. A projection of the growth trends in passenger traffic expected in each country during 1957-60 suggests, therefore, that air travel in the USSR may exceed the level in the US

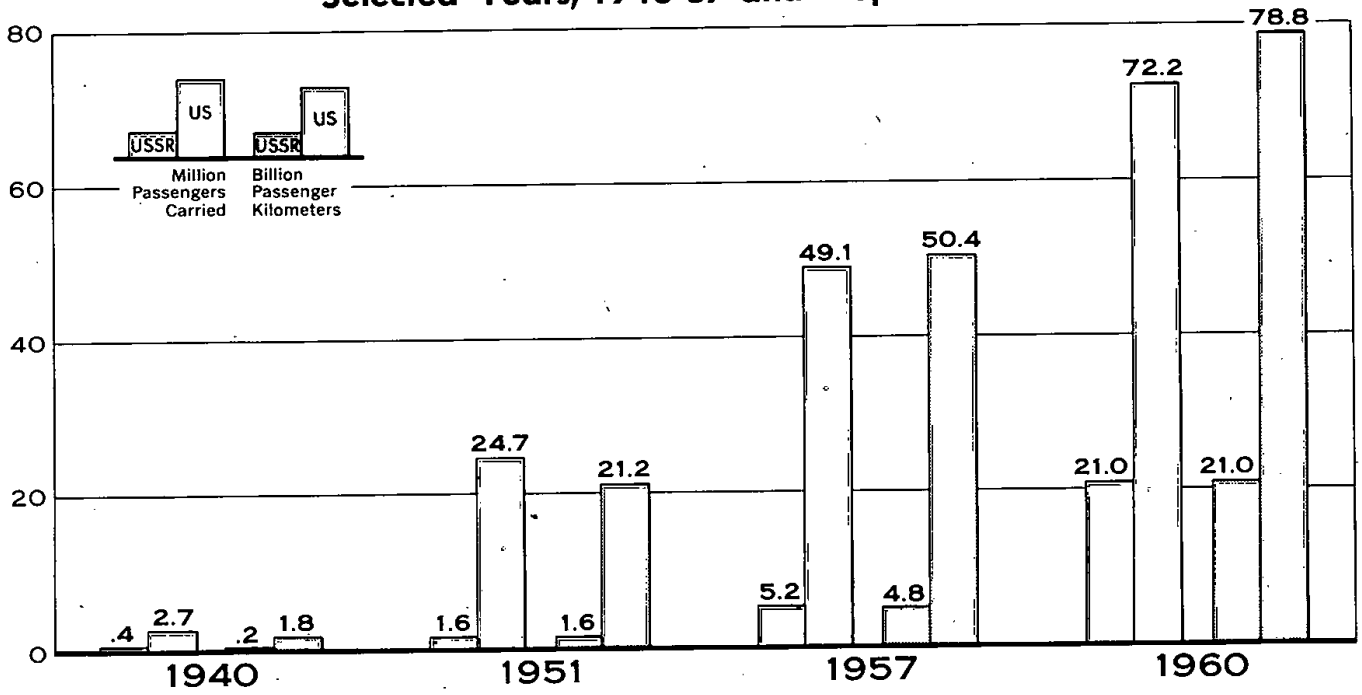
* In the same period, passenger turnover at Washington National Airport increased by almost the same number as that handled at Vnukovo during the entire year -- 499,000, or 12.6 percent above the level of 1956. 224/

** Following p. 38. Data in this chart are from [redacted] 50X1 Table 5, p. 34, above.

Figure 3

50X1

COMPARISON
OF SOVIET AND US CIVIL AIR PASSENGER TRAFFIC
Selected Years, 1940-57 and Projected 1960



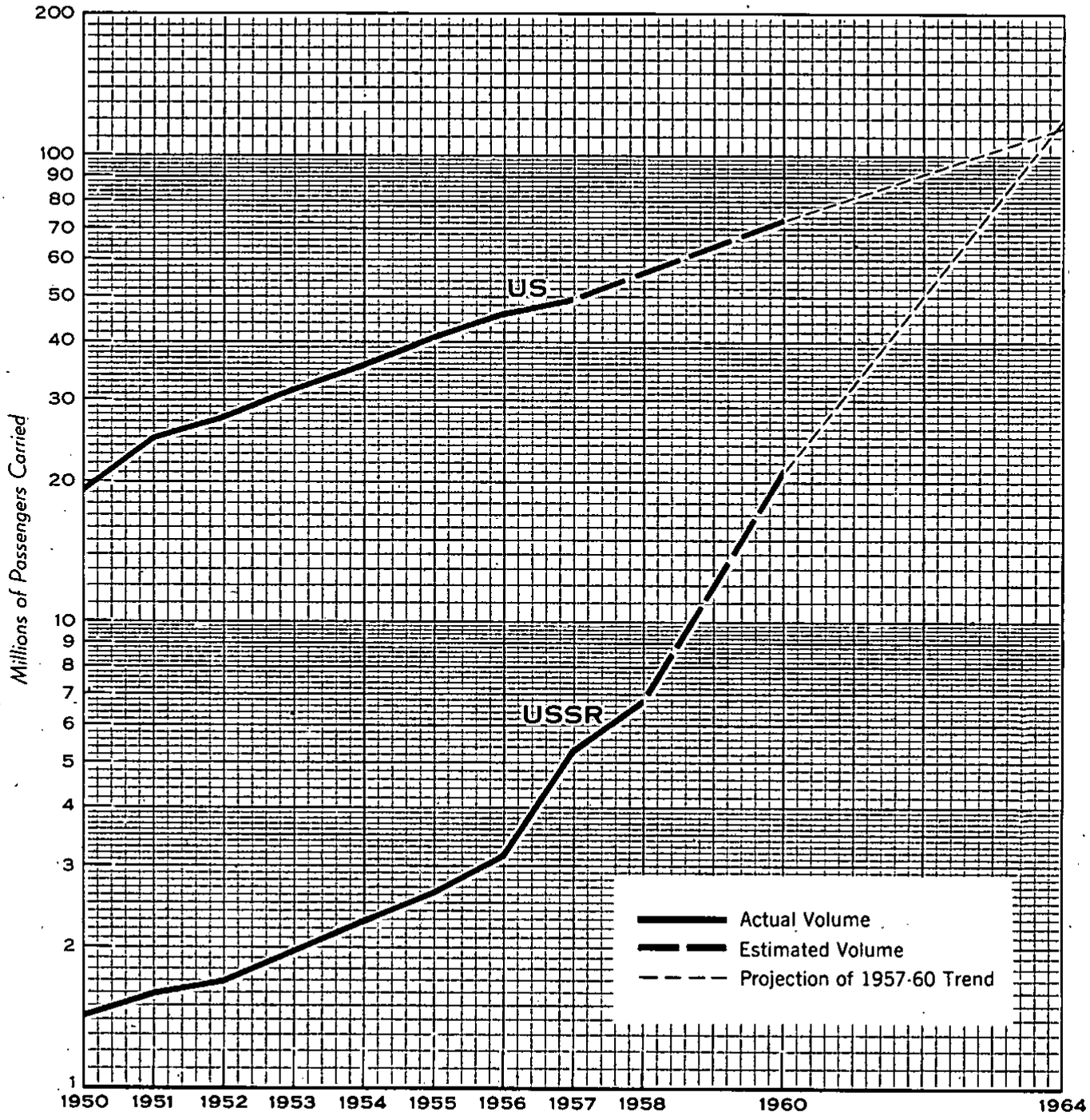
26865 6-58

50X1

Figure 50X1

COMPARISON OF RATES OF GROWTH OF SOVIET AND US CIVIL AIR PASSENGER TRAFFIC

1950-57 and Projected 1958-64



26864 6-58

50X1

by about 1965. This view of Soviet capabilities may be overly optimistic because of the relatively later timing of the reequipment programs of US airlines and the likelihood that the rate of growth of civil air traffic in the USSR will tend to level off beyond 1960. It is not, however, completely unrealistic, considering that the USSR has every incentive to develop air travel to the maximum and plans to encourage the demand among the masses of its widely dispersed population by reducing fares to the level of railroad fares for comparable distances. 228/

2. Freight and Mail Traffic.

The development of air freight and mail in the USSR has been considerably more impressive than progress in air passenger travel. Between 1922 and 1940 the amount of freight and mail carried rose steadily from only 1,900 to 59,900 tons. 229/ The volume of civilian commodity and mail traffic during the war years cannot be determined because of the military character of the civil air fleet in that period. Traffic growth was greatly stimulated, however, in the postwar reconstruction period, when rail and highway transportation facilities were still recovering from the serious damage sustained during the hostilities. 230/ The resultant reliance on civil air transport permitted an increase in the amount of freight and mail carried by Aeroflot to 175,000 tons by 1950, almost 3 times greater than the traffic level of 1940. Progress continued at a fairly steady rate during the Fifth Five Year Plan (1951-55), when the average annual increase in freight and mail traffic was 25,600 tons, or one-third greater than in the previous 5-year period. The growth of air freight and mail in the USSR is shown in Table 6.*

The volume of air freight and mail service, as expressed in ton-kilometer performance, has also grown substantially. Between 1940 and 1950 the rate of increase in ton-kilometer performance exceeded by a wide margin the increase in freight and mail tonnage carried because of an increase of more than 100 percent in average length of haul in that period. Progress continued during the Fourth Five Year Plan (1946-50) but at an appreciably lower rate because of a decreasing average length of haul. The average annual increase in performance during this period was 22.8 million tkm. In the subsequent 5-year period, which began with a sharp increase in the length of haul to 1,488 km, the average annual increment rose to 36.4 million tkm, although the over-all plan was fulfilled by only 85 percent. 231/ The failure to achieve the planned volume of performance during this period may have been caused by the continued rather erratic behavior of the average length of haul -- a type of behavior which apparently is inherent in this kind of service.**

* Table 6 follows on p. 40.

** Continued on p. 42.

Table 6

Freight and Mail Traffic of the Soviet Civil Air Fleet
Selected Years, 1940-60

Year	Freight Carried (Metric Tons)	Mail Carried (Metric Tons)	Total Freight and Mail Carried a/* (Metric Tons)	Average Length of Freight and Mail Haul b/ (Kilometers)	Freight and Mail Ton-Kilometers Performed (Thousand)	Index (1940 = 100)		
						Freight and Mail Carried	Average Length of Haul	Ton-Kilometers Performed
1940	45,600 c/	14,300 c/	59,900	608	36,400 d/	100	100	100
1945	70,700 e/	7,900 e/	78,600	1,272	100,000 e/	131	209	275
1946	83,400 f/	16,000 g/	99,400	1,268	126,000 h/	166	208	346
1947	109,000 c/	11,000 i/	120,000 j/	1,257	151,000 h/	200	207	415
1948	122,000 k/	16,000 k/	138,000	1,246	172,000 h/	230	205	473
1949	130,000 k/	24,000 k/	154,000	1,235	190,000 h/	257	203	522
1950	145,000 e/	30,000 e/	175,000	1,223	214,000 e/	292	201	588
Average annual increase, 1946-50	14,900	4,400	19,300		22,800			
1951	179,000 l/	36,000 l/	215,000 e/	1,488	320,000 m/	359	245	879
1952	194,000 l/	44,000 l/	238,000 e/	1,408	335,000 n/	397	232	920
1953	208,000 l/	53,000 l/	261,000 e/	1,352	353,000 o/	436	222	970
1954	220,000 e/	62,000 e/	282,000	1,362	384,000 e/	471	224	1,055
1955	233,000 e/	70,000 e/	303,000	1,307	396,000 e/	506	215	1,088
Average annual increase, 1951-55	17,600	8,000	25,600		36,400			
1956	292,000 e/	82,000 e/	374,000	1,364	510,000 e/	624	224	1,401
1957	352,000 p/	100,000 p/	452,000 q/	1,287	582,000 r/			
1958	413,000 p/	116,000 p/	529,000 s/	1,301	688,000 t/			
1960 (Plan)	475,000 p/	134,000 p/	609,000 u/	1,300	792,000 u/			

* Footnotes for Table 6 follow on p. 41.

Table 6

Freight and Mail Traffic of the Soviet Civil Air Fleet
Selected Years, 1940-60
(Continued)

a. Except where otherwise indicated, totals were derived by adding freight and mail carried.
b. Except where otherwise indicated, average length of haul was derived by dividing freight and mail ton-kilometers by total freight and mail carried.
c. 232/
d. 233/
e. Indexes for freight and mail carried and for ton-kilometers performed 234/ were applied to base-year figures.
f. 235/
g. [redacted]8,000 tons of mail were carried during the first half of 1946. 236/ It was assumed that at least a similar volume would be carried during the second half of the year. 50X1
h. Interpolated by applying the average annual rate of decrease during 1945-50 to obtain the average number of kilometers of freight and mail hauled for each of these years. These figures were then applied to the total tonnage of freight and mail carried to obtain the freight and mail ton-kilometers performed.
i. Derived by subtracting freight carried from total mail and freight.
j. 237/
k. Interpolated on the basis of the trend between 1945 and 1950 for which information is given.
l. Interpolated on the basis of the trend in total mail and freight carried between 1950 and 1955.
m. Extrapolated on the basis of the trend in freight and mail ton-kilometers performed between 1952 and 1955.
n. 238/
o. 239/
p. Estimated on the basis of the proportion of freight to total traffic in 1956.
q. The level of freight and mail traffic in 1957 was 21 percent above that in 1956. 240/
r. It was assumed that the increase in ton-kilometer performance of 14.2 percent in the first half of 1957 above the level of 1956 241/ remained unchanged throughout the year.
s. The level of freight and mail shipments in 1958 was planned to be 17 percent above the level of 1957. 242/
t. Derived by applying the average length of haul, which, it is assumed, will level out at about 1,300 km through 1960, to total freight and mail carried.
u. The original Sixth Five Year Plan provided for a doubling of freight and mail turnover (ton-kilometers) between 1955 and 1960. 243/ The resultant figure was divided by its assumed average length of haul to obtain total freight and mail carried.

The introduction of the Tu-104 evidently is not expected to have as great an impact on freight and mail traffic as on passenger travel in the USSR. In 1956 the amount of freight and mail carried increased by 23 percent above the level of the previous year. At the same time a further increase in the average length of haul to 1,364 km, possibly the result of the employment of the relatively longer range Tu-104, facilitated an increase in performance to 510 million tkm. During 1957, however, with a growing number of the new jet aircraft available for service, the quantity of freight and mail traffic transported by Aeroflot expanded by only 21 percent, or about one-third the increase experienced in passenger travel. The anticipated impact of other modern turbine-powered aircraft of higher capacity on traffic in the next few years cannot be determined. Thus far, there evidently has been no revision of the original Sixth Five Year Plan, which provided for a doubling of freight and mail ton-kilometers. At this rate of expansion, Aeroflot will perform approximately 792 million tkm by 1960 and will carry more than 600,000 tons of air freight and mail, although this must now be considered a conservative estimate.

The development of air freight in the USSR seems in large part to have paralleled the eastward expansion of the Soviet economy. Consequently, freight transported by Aeroflot is primarily industrial in character and consists of many diverse commodities. Mechanical and electrical equipment must be hauled between various and often remote manufacturing centers to keep production lines moving. 244/ Copper goods from Balkhash are delivered by air to consuming factories throughout the USSR. Mica is carried from Irkutsk to Sverdlovsk and Leningrad, while medicines and radio tubes are distributed by air from Moscow. Civil air transport also plays an important role in the development of the new lands areas. Spare parts for farm machinery as well as ball bearings and belts for combines are shipped by air from Kuybyshev, Moscow, Minsk, Khar'kov, and Rostov to Kazakhstan, Siberia, and the Far East. Other commodities carried by Aeroflot include fish from the Baltic, Caspian, and Black Sea areas, and fruit and vegetables are delivered during the summer months to the central and northern regions from southern parts of the USSR. 245/ A considerable amount of air freight traffic now moves in transit, over route segments of several territorial administrations, and requires transloading at junction airports. In 1955, transit shipments accounted for almost 25 percent of all air freight, although, at such major air terminals as Moscow, Sverdlovsk, Kiev, and Khar'kov, such shipments accounted for as much as 40 percent of all consignments. For the most part, the increase in transit traffic can be attributed to the growth of production in the areas of Siberia, the Ural Mountains, and the Far East -- a growth which has expanded the requirements for freight haulage between remote allied enterprises. 246/

There is little doubt that the USSR pioneered in the development of air cargo transport. Almost since the establishment of the civil air fleet, air freight has been of great concern to it because of the emphasis on industrialization and the accompanying need to maintain widely dispersed production lines under a complex plan structure. Similarly, mail has been a priority cargo because of the necessity of disseminating volumes of propaganda and distributing official correspondence over vast areas of the country, many of which are inadequately served by surface transportation. At the same time, economic and governmental restrictions on private travel have artificially depressed the demand for air passenger service. Consequently, a large proportion of total aircraft payload has been allocated to the carriage of freight and mail. In 1936, for example, approximately three-fourths of total utilized payload capacity* was employed in the transportation of freight and mail. This proportion has declined rather steadily since then, but freight and mail continued to account for well over 50 percent of the entire utilized payload of civil aircraft through 1956. In contrast, freight and mail traffic carried by scheduled US airlines in that year accounted for less than 20 percent of total traffic.** The original Sixth Five Year Plan provided for a substantial change in the relative composition of Soviet air traffic in favor of passenger carriage. 248/ The comparatively greater rate of growth in the number of passengers carried in 1957, however, and the expansion of the original planned levels of passenger traffic will probably result in an even larger decline in the relative position of freight and mail carried on Soviet air routes. The changing relationship of freight and mail to total traffic in Soviet civil aviation is shown for selected years in Table 7.***

Air freight in the USSR developed at a slower rate than in the US, where a dense network of surface transportation more adequately serves the economy. In 1940, for example, the volume of freight ton-kilometer service provided by US air carriers was only 18 percent of the performance of Aeroflot. Soviet claims that the USSR ranks first in air freight service among the leading nations

* The term utilized payload capacity as used in this report denotes the aggregate tonnage of passengers, baggage, freight, and mail carried. This term should be distinguished from payload capacity, which in this context would mean the total quantity that could have been transported if utilization had been 100 percent.

** Based on the relationship of freight, express, and mail ton-miles to total revenue ton-miles given in source 247/. Conversion of these data to metric tons, so as to be strictly comparable to Soviet figures, indicates that the relationship is the same.

*** Table 7 follows on p. 44.

Table 7

Composition of Soviet Civil Air Traffic
Selected Years, 1936-56

Thousand Metric Tons

Year	Passengers Carried a/	Freight and Mail Carried b/	Total Passengers and Freight and Mail Carried	Percent of Freight and Mail to Total
1936	14.0 c/	42.9 c/	56.9	75
1940	30.5	59.9	90.4	66
1945	46.6	78.6	125.2	63
1950	119.6	175.0	294.6	59
1955	221.4	303.0	524.4	58
1956	266.3	374.0	640.3	58

a. Based on the number of passengers carried (from Table 5, p. 34, above, unless otherwise indicated) multiplied by 187 pounds, given in source 249/ as the weight assigned per adult passenger (with baggage) in deriving statistics on performance of Soviet civil air transport. The result was divided by 2,204.6 pounds to obtain the volume of passengers carried, in metric tons. Soviet statisticians use another conversion factor for children, as do Free World airlines, but the proportion of children to total passenger traffic is unknown. As a result, the figures given in the last column, although believed to be generally accurate, may be overstated by as much as 10 to 15 percent.
b. Data are from Table 6 (p. 40, above), unless otherwise indicated.
c. 250/

of the world 251/ do not, however, have any current validity, as shown in Figure 5.* As a result of the growing demand for air freight service in the US after World War II, the performance of US carriers grew from 45.1 million freight tkm in 1945 to 394.7 million tkm in

* Following p. 44. In this chart, US air carrier performance, given in ton-miles, 252/ was converted to metric ton-kilometers for purposes of comparison with Soviet air transport performance. Soviet air transport performance is based on tonnage data multiplied by the average length of freight and mail haul (see Table 6, p. 40, above), which is believed to be applicable to freight carried.

Figure 5

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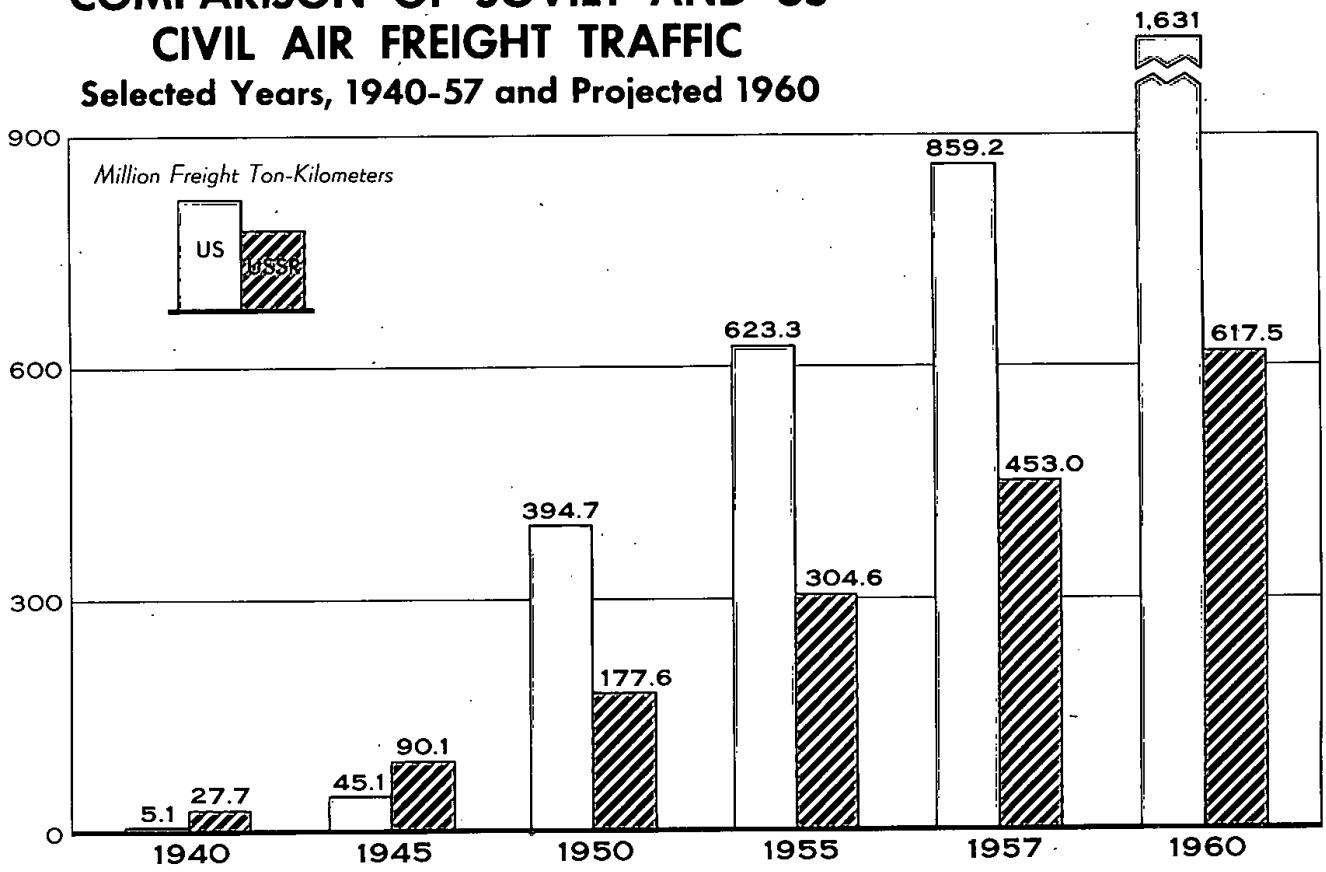
COMPARISON OF SOVIET AND US CIVIL AIR FREIGHT TRAFFIC

Selected Years, 1940-57 and Projected 1960



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1950, when it was more than 2.2 times the performance of Aeroflot. Since 1950, the performance of Soviet civil air transport has grown at a relatively faster rate than that of US carriers. As a result, the margin of performance of US airlines declined to approximately twice that of Aeroflot in 1957. 253/ Soviet plans for air freight traffic in the future are unknown, but its continued growth is considered likely because of the growing demands of a widely dispersed industrial economy which, until the advent of larger aircraft, could not be adequately serviced with the inferior low-capacity equipment available. US air freight also will continue to expand, evidently at a somewhat greater rate (20 to 28 percent annually through 1965) 254/ than that envisioned for Aeroflot in the original Sixth Five Year Plan. Consequently, US airlines will continue to exceed the freight performance of Soviet civil aviation, although the encouragement of air freight in the USSR may eventually reverse this trend.

3. Local Services.

The term local service aviation in the USSR is believed to be a Soviet designation for all civil air operations not contained in published schedules, including aerial spraying, photography, and prospecting. 255/ Local airlines, as carriers of passengers, freight, and mail, provide an extensive and in many areas an exclusive means of communication between trunklines and outlying districts. According to Soviet announcements, 40.3 percent of total civil air passenger traffic, or nearly 1.3 million persons, was carried on local routes in 1956 256/ compared with only 7 percent in 1935. 257/ By comparison, US feeder lines transported slightly more than 3.4 million passengers in the same year. 258/ The growth in freight and mail traffic on Soviet feeder lines has been only a little less impressive. During 1956, of the total freight and mail carried by Aeroflot, 29.5 and 36.3 percent, respectively, traveled on local air routes. 259/

In general, the growth of local air operations seems to have paralleled the eastward expansion of the Soviet economy, particularly in the central and eastern parts of the country, where surface transportation is inadequate and in some areas even nonexistent. As a result of the official preference accorded these so-called roadless areas, traffic volume* in Siberia and the Far East rose from 23.1 percent of total local airline performance in 1954 to 28 percent in 1955. 260/ The continued growth in economic activity in these outlying areas is expected to maintain the upward trend in local air traffic. The original Sixth Five Year Plan provided for

* Traffic volume is a Soviet term which is believed to mean total passenger, freight, and mail performance measured in ton-kilometers.

an expansion of local air service to five times the 1955 level compared with the threefold increase experienced during 1951-55. 261/

Thus far, local airlines have had to rely on a large fleet of outmoded single-engine aircraft. At the same time the service has grown in a rather haphazard manner, with little regard to regional requirements. The recent unveiling of the An-14 suggests that feeder as well as trunkline operations will benefit from the growing Soviet attention to civil air transport. The ability of the An-14 to use extremely small unpaved strips will be invaluable for operating from the primitive airfields that characterize Aeroflot's local routes. More attention is also being devoted to the economies of the areas served, in an effort to meet the growing demands of a variety of consumers. 262/ In the long run, however, local air service probably will derive its greatest impetus from the acquisition of Li-2 and larger piston-driven aircraft diverted from the main air routes. The effect on the capacity to carry passengers, freight, and mail on local routes should be almost as great as the anticipated impact of modern turbine-powered aircraft on trunkline traffic.

E. Efficiency.

The ability of the Soviet civil air system to meet the growing demands for passenger and freight service has been severaly limited by the low productivity of both equipment and personnel. Modernization programs undertaken since World War II have been interim measures at best. Aircraft already obsolete by Free World standards have been replaced by equipment only slightly less inferior. The failure of Aeroflot to develop advanced aids to air navigation and modern airport facilities has prevented necessary improvements in technical proficiency. As a result, aircraft utilization and labor productivity remain rather low, at levels far below those of the US. By comparison, scheduled US air carriers handled 12 times more traffic than Aeroflot in 1956, although in the aggregate they possessed fewer aircraft and only two-thirds the number of workers.

The vast difference in efficiency can be attributed primarily to larger capital inputs in US civil aviation as a means of economizing on labor costs, in contrast to the use of relatively large quantities of manpower in the USSR, where capital equipment has been less readily available. The trend in the USSR at present, however, is toward the increasing application of modern equipment and techniques, which is expected to result in significant improvements in efficiency. The introduction of new jet and turboprop aircraft, with maximum capacities far exceeding those of existing

piston-engine transports, will probably have the greatest impact on operations. Continued deficiencies, compounded by the difficulties inherent in the task of a comprehensive reequipment program, undoubtedly will prevent the full realization of this tremendous potential. A most serious defect -- one that is likely to be overlooked in efforts to improve the system -- is the adverse influence of a ponderous, bureaucratic administrative structure that pervades the civil air system.

1. Utilization of Equipment.

The gains in civil air traffic in the USSR in recent years are as much the result of progress achieved by Aeroflot in utilization of equipment as of the expansion of aircraft inventory.* The growing utilization of aircraft is reflected in the increased flying time of the average Li-2 from 97 264/ to 140 hours a month between 1954 and 1956. Similar progress has been made in the employment of Il-12 aircraft. 265/ As a result, the total distance flown by scheduled aircraft grew from 153.7 million km 266/ to 265.8 million km annually between 1954 and 1957, and total hours flown each year during the same period increased by 50 percent. 267/

Improvements in aircraft utilization appear to have been caused largely by the expansion of night flying, which is a relatively recent innovation in the USSR, rather than by advancements in aircraft design. The Fourth Five Year Plan (1946-50) provided for all-day operation on the most important routes, 268/ but the first regular night flight was not actually announced until mid-1948, 269/ a year when domestic and international airlines of the US were flying more night than daylight hours. 270/ As a result of this deficiency, operating hours of Soviet aircraft during the winter were reduced to 7 per day in some areas, 271/ and an excessively large part of potentially useful time was spent on the ground. In 1949, for example, the flight from Moscow to Vladivostok required 70 to 80 hours and included 3 overnight stops at intermediate terminals. 272/ It was not until 1956 that night flying became fairly common in the USSR, 273/ and many overnight stops could be eliminated. A recent announcement indicates that Soviet civil aircraft now spend about 40 percent of their scheduled flight time in night operations. 274/ Consequently, flight time between Moscow and Vladivostok with twin-engine equipment is 50 percent less than it was in 1949, and delays en route have been reduced to an average of less than 2 hours. 275/

* The civil air fleet is believed to have increased only slightly in recent years. It is estimated that the number of aircraft required to fulfill scheduled requirements increased from only 450 in 1954 263/ to 520 in 1957 (see Table 8, footnote d, p. 49, below, for derivation of the aircraft inventory scheduled in 1957).

The introduction in 1954 of a relay crew method similar to that employed by US airlines also had a favorable effect on utilization of equipment. The former system of permanently assigning flight personnel to specific aircraft not only set arbitrary limits on aircraft employment but made it difficult to plan and maintain flight schedules. The new system, which cannot be employed by the less active units of Aeroflot, evidently is becoming common on trunk routes in the USSR. 276/ As a result, many subordinate administrations have reported impressive gains in utilization of equipment. One subdivision (probably with a particularly poor past record) claimed that the utilization of its aircraft increased 2.5 times after adoption of the relay crew system. 277/

In spite of these advances, Aeroflot remains inferior to the air carriers of the US by almost every standard of efficiency, a disadvantage even conceded by Soviet officials. 278/ The average flying speed and number of hours flown daily by scheduled aircraft in the US are only one-third more than those of their counterparts in the USSR. In combination, however, these factors permit US aircraft to fly distances almost 70 percent greater on the average than aircraft scheduled by Aeroflot. Another difference of even greater significance is the larger number of seats available in the typical US aircraft. In 1957 the average aircraft in scheduled service in the USSR could accommodate only 16 passengers, but in the previous year, 52 seats were available in a typical US transport employed on domestic routes. The cumulative effect of the superior utilization of US aircraft is reflected in their greater potential performance. In 1957 the average scheduled Soviet aircraft could perform only 22,000 pkm daily, or less than one-fifth of the potential performance of the average US aircraft in use on internal routes, in spite of the considerably smaller load factor of the latter. Even this comparison, however, is believed to overstate the total capabilities of Aeroflot. In contrast with relative US figures, the indexes of Soviet utilization of equipment do not account for the numerous aircraft assigned to local routes. The inclusion of these much smaller and slower models would certainly make the comparison even less favorable to Aeroflot. The contrast in the relative rates of utilization of Soviet and US civil aircraft presented in Table 8* readily explains the vastly greater performance of US air carriers, although in the aggregate the US carriers possess fewer aircraft than Aeroflot.

Soviet officials continue to strive for greater utilization of equipment, but further improvements in the efficiency of piston-engine aircraft will be difficult to achieve because of the inherently limited potential of such aircraft. Aeroflot, for example, has been unsuccessful in its recent attempts to increase average aircraft speed, a major determinant in time and distance utilization, 279/

* Table 8 follows on p. 49.

Table 8

Comparison of Soviet and US Utilization of Civil Aircraft
1956 and 1957

Category	Per Average Aircraft in Scheduled Service in the USSR a/ (Mid-1957)	Per Average Aircraft in Scheduled Domestic Service in the US b/ (1956)	Ratio of US to Soviet Utilization of Aircraft
Flying speed (km per hour) c/	259	342	1.32
Number of seats available	16	52	3.25
Distance flown daily (km)	1,325 d/	2,245	1.69
Number of hours flown daily	5.1 d/	6.6	1.29
Passenger-kilometers available daily	22,000 d/	115,500	5.25
Passenger load factor (percent) e/	86 f/	63	0.73

a. Based on an analysis of the summer schedule of Aeroflot. 280/
b. Based on an analysis of data 281/ which provided utilization indexes on the entire scheduled civil air fleet.
c. Defined as the net speed, excluding stops.
d. Derived by dividing the various categories of utilization for the entire civil air fleet by the inventory of scheduled aircraft. To obtain this inventory, the average number of hours flown daily by Li-2 (4.7 hours) and Il-12 (5.6 hours) aircraft 282/ and an assumed average of 6.0 hours per day for the relatively superior Il-14 aircraft were weighted by the proportion of each type of aircraft in the total civil air fleet. The daily utilization rate per aircraft of 5.1 hours thus derived was divided into the average number of hours flown daily by all scheduled civil aircraft to obtain the overall inventory of 520 aircraft. It is unnecessary to adjust this figure because the

Table 8

Comparison of Soviet and US Utilization of Civil Aircraft
1956 and 1957
(Continued)

hourly utilization rate employed is believed to apply to all aircraft "listed" (a Soviet term for aircraft in operation) as well as those out of service for maintenance and in reserve. 283/

e. Defined as the percentage of passenger-kilometers flown to those available.

f. Reported to be the system load factor 284/ -- therefore, it is not clear whether the figure is restricted to passenger traffic performance or includes freight and mail as well. The former conjecture seems valid because 86 percent of total available passenger-kilometers in 1957 amounted to 22 percent less than actual performance in that year. The difference probably is accounted for by feeder line operations, which, because of the shorter haul involved, have a lesser share in total passenger-kilometer performance (22 percent) than in total passengers carried (40 percent). Moreover, the many criticisms by Aeroflot of subordinate units for failing to meet freight loading plans suggest an air freight load factor much lower than 86 percent.

in spite of the favorable changes in the composition of the air fleet that accompanied the introduction of new and modified twin-engine models. The lack of high-altitude equipment in most aircraft also prevents their fuller employment. Flights in some areas are frequently delayed several days by bad weather conditions because the unpressurized aircraft cannot fly above storms or take alternate routes at high altitudes. 285/ Over-all improvement in Soviet indexes of aircraft utilization, however, can be expected to accompany the introduction of new jet and turboprop transports. The original Sixth Five Year Plan, anticipating the growing use of modern equipment, provided for a general increase in average aircraft speed of about one-third between 1955 and 1960, but, like previous traffic goals, this may be conservative. 286/ The en route speed of the average Tu-104 in service in 1957, for example, was 665 km, or more than twice that of the smaller scheduled aircraft. The difference in annual distance traveled per aircraft also should be correspondingly greater because of the higher rates of utilization expected of the new aircraft.*

2. Labor Productivity.

A lack of information prevents a time-series analysis of the productivity of personnel assigned to the Soviet civil air fleet. In all probability, however, labor productivity in terms of cumulated ton-kilometers performed per employee has shown progressive improvement in recent years for the same reasons that utilization of aircraft has increased. It is not likely that the introduction of night flights or of the relay crew method was accompanied by a large expansion of the labor force, at least not in direct relation to concomitant gains in traffic performance. Furthermore, the trend in the average lengths of passenger and freight hauls, although erratic in some years, in general has been upward since World War II.

The operational staffs of Aeroflot seem to have shown the greatest improvement in productivity. Maintenance and repair facilities, already laboring under obsolete methods and with indifferent technicians, 288/ were strained even further by the increases in regulation maintenance that accompanied the achievement

* It should be noted that in this as in other aspects of performance the Tu-104 has not measured up to expectations: its average utilization rate during the first year of operation has fallen below the original goal of 6.6 hours daily. 287/ This is, however, a common experience with new aircraft and cannot be used to predict future rates of utilization of either the Tu-104 or other new Soviet transports.

of higher rates of utilization of aircraft. One central problem in expanding labor productivity has been the difficulty in maintaining an adequate supply of spare parts and material at the workshops. 289/ As a result of chronic shortages, the average aircraft subordinate to the civil air fleet in 1956 spent 120 days in maintenance and overhaul, or about 35 percent of total available time. The serious concern of Aeroflot officials, shown in numerous articles in Soviet publications, has led to many campaigns to improve the productivity of servicing establishments. For the most part, however, the major problems of distribution and production are beyond the control of local units, which must depend on a multitude of factories and agencies for spare parts and materials. One particular repair base has to obtain its requirements from 40 different places in the country. 290/ The prospective employment of modern aircraft of much greater complexity, moreover, will probably compound the maintenance difficulties now confronting Aeroflot -- there are already examples of rather extensive delays of Tu-104 aircraft because of the unavailability of spare parts at en route terminals. 291/ Failure to eliminate such wasteful bottlenecks will make it difficult to realize the high potential utilization of modern aircraft.

Another problem that limits the efficiency of civil aviation ground and flight personnel is the inadequacy of equipment at many Soviet air terminals. Mechanical loaders are not generally available to facilitate the transfer of freight to and from aircraft. In some places, even such rudimentary hand tools as wrenches and other simple instruments are lacking. Shortages such as these often cause delays in the preparation of aircraft for flight which lead to excessive ground time. 292/ Attempts to improve terminal facilities evidently have not been too successful, for average scheduled aircraft speed, which includes time spent in terminals, actually decreased between 1954 293/ and 1956. 294/ One Soviet author, complaining of the protracted terminal delays of Aeroflot aircraft, suggests that in many cases 30 to 40 percent of en route time is still spent at the airport. On the Moscow-Novosibirsk run, which is cited as a particularly poor example, flight time with piston-driven equipment takes 10 hours, and another 6 hours are required at 3 intermediate terminals. 295/

Consequently, in spite of some progress, the productivity of Soviet civil air transport personnel remains quite low, especially in comparison with that of the US. In mid-1957, Aeroflot had approximately 210,000 employees,* including pilots, flight and service engineers, technicians, and administrative staffs. Their productivity,

* Based on a Soviet statement 296/ that 200,000 employees of Aeroflot, or 96 percent of the total labor force, were unionized.

measured in 1956 traffic performance, was about 18,000 cumulated tkm per worker. On the other hand, in the same year, scheduled domestic and international airlines of the US, with 131,500 personnel, produced 343,700 cumulated tkm per employee. 297/ With approximately two-thirds the number of workers, therefore, US airlines handled approximately 12 times more traffic than Aeroflot. The low efficiency of Soviet employees is also evident in the quantity of labor required in relation to the size of the civil air system. In 1956, there were 1.65 km of air routes for each Aeroflot employee compared with 2.43 km per employee for US airlines.

The relatively greater reliance on labor in the USSR than in the US apparently is typical of the transport sector of the Soviet economy, for it is also characteristic of the railroads. 298/ In civil aviation the difference is caused largely by the use of faster, heavier aircraft in the US, which requires relatively larger amounts of capital investment but economizes on labor costs. With capital equipment limited, the USSR rationally has employed larger quantities of labor, which has been more readily available, to meet the demands for air transport. To compensate for its inability to obtain larger aircraft, Aeroflot has attempted by other means to increase the capacity of existing equipment. Some progress has been made in reducing fuel consumption and in constructing aircraft of lighter weight, both of which permit greater payloads. Aeroflot has also found it necessary to eliminate the engineer on some flights and to exclude fuel used on the ground from preflight calculations in order to increase permissible takeoff weight. 299/ In the aggregate, it is believed that these expedients have resulted in relatively little improvement in the coefficient of performance of the average worker. They serve to illustrate, however, the enormous impact that the Tu-104 and other modern transports will have on labor productivity. In terms of hourly passenger-kilometer performance, the new aircraft have potential capacities ranging from roughly 8 to 27 times greater than those of the best piston-engine models now in service, as shown in Table 9.*

3. Technical Proficiency.

The Soviet policy of limiting investment in civil air transport has not only delayed the introduction of suitable aircraft but has also prevented improvement in the technical proficiency of Aeroflot. As a result, both utilization of aircraft and labor productivity have suffered. Soviet airfields, with few exceptions, are in relatively poor condition by Free World standards. Many landing strips consist of natural surface areas, with only the most essential

* Table 9 follows on p. 54.

Table 9

Comparison of the Il-14 with Other Soviet Civil Aircraft a/
1957

Type of Aircraft	Maximum Number of Passengers	Cruising Speed (Kilometers per Hour)	Capacity (Passenger-Kilometers per Hour)	Ratio to Il-14 Performance Capacity
Il-14	24	305	7,320	1
Tu-104	70	800	56,000	7.7
Il-18	100	630	63,000	8.6
An-10	126	600	75,600	10.3
Tu-110	100	790	79,000	10.8
Tu-114	220	900	198,000	27

a. See C, 1, a, p. 14, above.

ancillary facilities. 300/ Runways that are not concrete become inoperative in many regions during heavy rains; and in the summer period, loose sand and dust constitute a menace to aircraft engines. 301/ Passenger facilities are also limited in most cases, with none of the services that are available at major US airports. 302/ Even those air terminals built since World War II seem to have been underplanned and will therefore be too small to handle expected traffic levels. 303/ Vnukovo handles a steady stream of passengers every day, but it has only four arrival and departure ramps, which even now are seldom empty. 304/

Furthermore, although night and all-weather flights are now fairly common, aids to air navigation in the USSR in most cases are still elementary. The radio compass and dead reckoning serve as the main means of en route navigation, although both have been frequently disregarded by Soviet pilots in favor of visual contact. 305/ The standard landing aid is provided on the ground by medium-frequency beacons and very-high-frequency marker beacons. 306/ Since 1956, however, there has been a growing, though still limited, employment of radar facilities for air traffic control and, to a lesser extent, advanced instrument landing systems at major airports. 307/ In general, these facilities are similar to those adopted in the Free World a decade ago, although they appear to be suitable for their intended tasks. 308/

Air traffic control procedures in the USSR also are generally similar to those adhered to by member nations of the International Civil Aviation Organization (ICAO). Airspace is divided into a series of contiguous flight information sectors, each of which is under the jurisdiction of an air traffic control center responsible for the coordination of all aircraft movements within and through the area. Regions of high-density traffic and of numerous airways are further subdivided into sections under the responsibility of subcontrollers. 309/ Aircraft are passed between controlled areas until they reach the terminal airport, where they become subject to its control pattern. Aeroflot claims that its system of flight control is superior to that of foreign nations because of the greater degree of authority of the ground operators. This lack of authority in Free World air practice is claimed by the USSR to be caused by the fact that ground equipment in other countries belongs to the state, whereas the carriers are private organizations 310/ -- an analysis which has no basis in fact.

In any case, Aeroflot cannot claim superiority in the efficiency of operation of its navigation aids, many of which have a low degree of accuracy. Flight testing of new landing systems apparently is poorly organized, even at such first-class airports as Vnukovo and Leningrad. Moreover, traffic controllers have little assurance when giving landing clearance that the entire equipment complex will function satisfactorily. 311/ The unreliability of Soviet aeronavigational aids is well illustrated by the difficulties that arose during the flight of a Tu-104 carrying Malenkov and a number of lesser dignitaries from London to Moscow in early 1956. On nearing Vnukovo it was learned that, with a 300-foot ceiling and visibility less than three-quarters of a mile, only the radio and marker beacons were operating, although the airport is equipped with approach control equipment, airport surveillance radar, an instrument landing system, and other modern approach aids. As a result, the aircraft had to make two passes to land, the first ending in a fast ascent after the aircraft had actually touched down and the second accomplished only after violent landing corrections and heavy brake applications. That these conditions prevailed, in spite of 4 hours' advance notice of the aircraft's arrival and in spite of the importance of its passengers, suggests that the occurrence at Vnukovo was not unusual. 312/

Other problems confronting the air traffic control system in the USSR are similar to those that have troubled many Free World nations for some years. These problems can be attributed to the increasing density of air traffic at major centers of the USSR, which has severely overburdened ground controllers and virtually saturated direction finders and control tower radio circuits. A

recent detailed complaint of a civil aircraft radio operator brought some improvement in the approach procedures, 313/ but the vastly increased speeds of modern aircraft will require a tremendous improvement in the efficiency and precision of Soviet navigation aids. 314/

Aeroflot is certainly aware of the impact of jet aircraft on its present flight control equipment and airport system. The original Sixth Five Year Plan provided for an increase in capital investment for the construction of airports and ancillary facilities of 100 percent above the level of the previous 5 years. 315/ The intention to introduce advance laborsaving devices on a greater scale is reflected in the many references in Soviet literature to computers, plotters, and other automatic navigation aids. Continued criticism at high official levels of outdated navigation techniques suggests that such complex equipment has not yet been introduced. 316/ Its development, however, must certainly be under way, for Aeroflot expects to have its traffic control problems solved by 1960. 317/ Furthermore, 40 main air terminals are being reconstructed and expanded to accommodate heavy jet and turboprop airliners. Runways measuring at least 8,200 feet in length as well as modern passenger facilities are to be installed at each of the airports selected. 318/ As a result, the main terminal building at Vnukovo is being extended 56 feet to provide separate handling for domestic and international traffic. 319/ Runways and parking areas are also being expanded. The main runway, which formerly consisted of 8,200 feet of concrete and a 1,600-foot earthen overrun, has been paved with concrete throughout its length. 320/ Considerable progress in runway construction is also believed to have been achieved at other main trunkline terminals. Continued emphasis on airport renovation is reflected in the 1958 Plan to increase the volume of capital investment in the construction of runways and ancillary facilities by 50 percent above the level of the previous year. 321/

The extensive modernization program of Aeroflot is also expected to result in significant improvements in the productivity of its employees. The original Sixth Five Year Plan provided for an increase of 80 to 90 percent in the labor productivity of operating personnel and of 40 to 50 percent in the repair subdivisions. 322/ Increments to the labor force are to be minimized through the application of advanced electronic devices, to an even "greater extent than in the US." 323/ Aeroflot has requested the Scientific Research Institute of the GUGVF to develop computing equipment to plan the handling of traffic loads, schedule overhaul work, and analyze the operations of the air fleet. It also plans to introduce flight simulators to replace the present costly system of pilot training, which essentially is accomplished by actual aircraft operation and therefore is not sufficiently refined to meet the requirements of high-speed

aircraft. 324/ For the most part, however, the greatest gains in labor productivity are expected to accompany the employment of aircraft of larger capacity. It is certain that large additional quantities of manpower, including pilots, servicing technicians, dispatchers, and stewardesses will be required. The US government estimates that the introduction of new equipment, turbine and piston-driven, will make it necessary to increase these employee categories by 40 percent between 1956 and 1960. 325/ Nevertheless, assuming that even twice this expansion in manpower is required by Aeroflot because of the greater difference in equipment now employed, the productivity of civil aviation employees, based on anticipated traffic levels, will approximately triple by 1960.

4. Administrative Effectiveness.

Much of the waste in Soviet civil air transport can be attributed directly to the pervasive influence of the excessive bureaucracy inherent in the Communist political and economic system. Top management of civil aviation is reported to be proficient, 326/ but the intricate administrative mechanism of Aeroflot and its associated organizations has created a profusion of contradictory relationships. Infractions of plans result in a multitude of directives from headquarters, political divisions, the Party, and Komsomol and trade union groups. 327/ Administrative heads therefore are often under the political supervision of their subordinates, and the limits of authority are utterly confused. Thus responsibility can be easily shifted or can be unpredictably assumed for something that is largely under the control of others. 328/ Under these conditions, subordinates are reluctant to make decisions. [redacted] 50X1
[redacted] the complaint of an Aeroflot deputy that he is frequently 50X1
called out in the middle of the night to solve problems arising in distant parts of the air system, 329/ where local supervisors cannot or will not respond.

The inefficiency of the complicated organizational structure of Soviet civil aviation is manifested in the system of socialist competition that is persistently maintained among regional administrations, airports, and individuals. One of the indexes by which the results of competition are measured is the percent of payload achieved. For the most part, the over-all volume of loading is beyond the control of the competing units. 330/ To achieve high ratings, however, many shipping departments passively resist efforts to load aircraft from outside territories, preferring instead to reserve as much freight as possible for aircraft of their own particular units. According to one Soviet author, flight crews, attempting to fulfill their own productivity norms, are forced to haunt shipping departments in search of freight. As a result, the speed of

air transportation as well as payload indexes is unnecessarily low. 331/ It is probably also safe to assume that delays thus occasioned make it difficult for Aeroflot to attract potential customers from rail to air transport.

The inflexibility inherent in the ponderous centralized administrative system of Aeroflot also prevents efficient modifications in operating plans at the local level to meet varying situations. The exaggerated insistence by Aeroflot headquarters on regularity, for example, has made it impossible to take advantage of a favorable wind in flight because aircraft are not permitted to land ahead of schedule, even at smaller airports where there is no traffic congestion. As a result, aircraft frequently are kept circling above the airfield, using fuel at the rate of 200 rubles for each circle required. Aircraft of outside territorial units apparently suffer greatest from this inconvenience, because ground controllers have been known to show a preference to aircraft of their own administrative subdivisions in allocating flying altitudes. 332/

Efforts to eliminate these deficiencies thus far have been confined largely to urging better cooperation between the various subdivisional levels, 333/ which are frequently criticized for shortcomings in management, 334/ and to numerous directives. The reaction to these expedients at the local level is well illustrated in a recent complaint of a unit commander. "Instead of concrete help," he said, "we are flooded with paper. Over 3,000 orders and instructions were received by the staff of the unit from the territorial administration during 1955. By 20 April 1956 the letters for 1956 already had reached consecutive number 2,697." 335/ There is some reason to believe that Aeroflot is now trying to follow the trend toward decentralization observed in other sectors of the economy. Recent directives have urged a broadening of the number of problems to be decided at the territorial and subordinate levels to increase their flexibility. 336/ The extent of success of this latest approach cannot be predicted, but its achievement probably will be impeded by the existing unfavorable administrative environment.

F. Fiscal Policies and Profitability.

Civil air transport in the USSR, although established as a self-supporting enterprise, has often required state subsidies. Thus the USSR appropriated 434 million rubles to cover deficits in civil aviation between 1931 and 1933. The subsidy in 1931 amounted to 53 percent of total expenditures, but it was planned to reduce state financial assistance to 35 percent in 1933. During

these years, many attempts were made to encourage the use of air transport in an attempt to reduce operating costs below income. The predecessor of Aeroflot was even permitted to issue debentures to other economic and industrial institutions interested in air service in their localities. In return, these organizations were given priority in the transport of passengers, freight, and mail, for which they received a 10-percent discount, although they had to guarantee a certain payload or risk suspension of the service. 337/ This system, however, was not very effective, for it evidently failed to survive the major reorganization that created the GUGVF in 1932.

In recent years, Aeroflot has claimed to be operating at a profit, in spite of the excessively high costs incurred through the limited productivity of its equipment and personnel. Not all of the administrations and subdivisional organizations of civil aviation meet the financial accumulations plan; some actually show considerable deficits, particularly those units in the eastern regions of the country, such as the Central Asia, Far East, and East Siberia Territorial Administrations, where traffic density is seasonally low. 338/ Nevertheless, net earnings in 1955 allegedly amounted to more than 100 million rubles,* 339/ and in the following year, income on passenger, freight, and mail traffic was 9.2 percent in excess of expenses, 340/ or slightly greater than the revenue ratio of all scheduled domestic air carriers in the US. 341/ It is impossible to determine the precise value of earnings in the latter year, but it may have been in the neighborhood of 200 million rubles.**

It is difficult to believe that Aeroflot could realize a profit, even with the substantial reductions in operating costs that apparently accompany increases in utilization of equipment and in labor efficiency. Modest rates of productivity, as Aeroflot admits, continue to keep expenses at high levels, even in comparison with other means of transportation in the USSR. 343/ On the other hand, the price of air transport in the USSR is set fairly high,

* Ruble values in this report are expressed in current rubles and may be converted to US dollars at the official rate of exchange of 4 rubles to US $1. This exchange rate, however, does not necessarily reflect the true dollar value.

** This estimate is based on [redacted] an increase of 1 percent in payload of all civil aircraft would add 20 million to 25 million rubles in income. This percentage was applied to a rough estimate of the aggregate volume of passenger, freight, and mail traffic carried in 1956 to determine the amount of tonnage that equaled 20 million to 25 million rubles. The income factor in rubles per ton thus derived was then applied to the total volume of traffic carried to determine total income.

50X1

evidently at levels calculated to compensate for excessive operating expenses. The average fare per passenger-kilometer on Aeroflot routes, based on an analysis of its schedule for the summer of 1957, was about 32 kopeks compared with 3.3 cents for domestic air carriers in the US. 344/ Thus the ruble-dollar ratio of Soviet-US air travel (9.7 to 1) is almost twice that estimated for rail passenger traffic (5.1 to 1). 345/ A differential of this magnitude would permit the absorption of extraordinarily high operating expenses before cutting very deeply into profit margins.

The historically high tariff structure of Aeroflot, although eliminating financial deficits in recent years, must certainly have made it difficult for Aeroflot to attract customers from the railroads. Apparently as a result, there have been some reductions in passenger and freight rates in an effort to encourage air transport.* On 15 October 1956, return passenger fares on domestic routes were lowered 10 percent, and fares on many individual routes were appreciably decreased, in some cases up to 60 percent. 346/ Moreover, by special agreement with local administrations of Aeroflot, some organizations were permitted tariff discounts of up to 50 percent to promote backhauling on certain routes where payload utilization is low. 347/ Nevertheless, the price of surface transportation continues to be more attractive. Selected first-class passenger fares listed in the summer airline schedule of 1957 are from 50 to 130 percent greater than the cost of comparable rail accommodations between the same points. 348/ The longer trips cost relatively more by air than shorter hauls, in contrast to the US, where the cost of air travel is approximately the same as that of first-class rail accommodations over long distances.

In the near future, Aeroflot expects to be in a more favorable competitive position. The original Sixth Five Year Plan provided for a reduction in air passenger fares to the level of first-class rail rates for comparable distances by the end of 1960. 349/ The principal basis for this optimism is the lower operating costs associated with new jet and turboprop aircraft because of their vastly greater productivity. According to Soviet engineers, tests have shown that the cost of operating turboprop aircraft for distances up to 540 nautical miles is 30 to 50 percent less than that of the piston-engine equipment now employed. 350/ It is stated, for example, that the extensive use of the An-10 will reduce ton-kilometer costs by 40 percent. No such claims are made for the Tu-104, but if any cost reductions have accompanied the use of the aircraft they certainly have not been passed on to the consumer.

* The reduction in passenger and freight rates also tends to lend credibility to Soviet claims of substantial profits in air transport.

The new jet commands a 10-percent premium on domestic routes, although on international routes, where there is an element of foreign competition, the fares are the same as those for Soviet piston-engine aircraft. 351/

The introduction of larger equipment on local routes, assuming an adequate demand for passenger and freight service, will permit sizable reductions in over-all expenses. For example, it now costs Aeroflot 11.5 rubles per ton-kilometer and 1.15 rubles per passenger-kilometer to operate its Yak-12 aircraft, while the operating costs of the An-2 are 4.7 rubles per ton-kilometer and 0.59 rubles per passenger-kilometer. On the other hand, the Li-2, which will be substituted for the smaller aircraft now employed locally, can be operated at 3.41 rubles per ton-kilometer and 0.33 rubles per passenger-kilometer. 352/

Aeroflot is not relying solely on the new aircraft to increase the income productivity of its equipment and personnel. Employee apathy is being attacked by wage reforms. Aeroflot admits that serious shortcomings, such as its cumbersome and complex system of bonuses, have lowered the personal interest of workers and have hindered improvements in labor productivity. Recent efforts to eliminate these deficiencies have led to consideration of a new, supposedly simplified wage scale to be uniformly applied to all employees of the operating and repair subdivisions. In essence, many of the intricacies of the former system have been retained. Thus geographical coefficients and work norms have had to be established as well as a revised bonus system to reward outstanding employees. Nevertheless, the general increase in wages that will accompany this reform may eliminate some indifference among the workers. 353/

II. Civil Aviation Policy Toward the Free World.

The basic Soviet policy in the field of civil aviation until 1954 was confined to the creation of an extensive domestic air system capable of providing relatively rapid communication among widely separated sections of the USSR and within the Sino-Soviet Bloc. Soviet air space was banned to all foreign airlines, including those of the European and Far Eastern Satellites, whose only air connection with Moscow was provided by Aeroflot. To insure proper coordination of air policy objectives, the USSR controlled civil aviation throughout the Bloc through partial ownership and direction of Communist state air carriers. 354/ At the same time, Soviet intransigence during the cold war period stirred countries in the Free World to adopt a common policy designed to prevent the USSR and other members of the Bloc from benefiting from the technological advances of Free World aircraft industries and from extending international air services beyond their territories, unless a balance of advantages from such action (considering economic, political, and security factors) favored the Free World. 355/ The USSR therefore remained largely unaffected by the high state of development that characterized international civil aviation in the Free World in the postwar period.

In 1954 the foreign policy of the USSR underwent significant changes that led to a general easing of international tensions and, in the narrower field of civil aviation, to a liberalization of policy. Along with other moves stressing nominal equality among members of the Sino-Soviet Bloc, the USSR began in late 1954 to regularize its air transport relations with other Communist countries by liquidating its interests in jointly owned civil airlines. Agreements concluded simultaneously provided for air service by national carriers between the USSR and other Communist capitals, although as yet only five Bloc airlines have availed themselves of reciprocal privileges. 356/ In the following year the agreement of the US, the UK, France, and the USSR to meet at the foreign ministerial level in Geneva for the first time in the postwar period raised the prospect of expanding east-west air communications. 357/ During the ensuing conference in the latter part of 1955 the three Free World powers, in an effort to normalize east-west aviation relations, proposed that the USSR concur in principle to the establishment of reciprocal air service with the Free World, on the basis of the liberal provisions contained in bilateral arrangements prevalent in the Free World. The Soviet delegation rejected this suggestion -- not, as subsequent events have proved, because of a continued lack of interest in air connections outside the Bloc, but to remain sufficiently flexible to conclude bilateral arrangements on terms most advantageous to the USSR, thereby minimizing the inferior competitive position of Aeroflot as an international carrier. Intergovernmental air transport agreements were concluded with seven countries of the

Free World in late 1955 and early 1956, each agreement being either relatively more favorable to the USSR or with nations unable to establish reciprocal service.

Subsequent efforts of the USSR to expand its foreign air relations were interrupted by the adverse world reaction to Soviet intervention in Hungary and to the Egyptian crisis. They have since resumed, however, on a large scale and with a more liberal approach to reciprocity which reflects a growing awareness in the USSR of the value of an extensive international air network in obtaining propaganda advantages and in implementing the post-Stalin policy of coexistence and economic penetration. Of particular significance is the apparent Soviet intention to transit the territories of countries in the Free World to reach more easily the sensitive areas of the Middle East, Africa, Asia, and, ultimately, Latin America. To gain its objectives in air policy, the USSR will probably rely on the competitive environment in the Free World, at least until its air relations with peripheral countries in Western Europe, Asia, and the Far East are stabilized, rather than on participation in such multilateral arrangements as the International Civil Aviation Organization (ICAO) or the International Air Transport Association (IATA).

The USSR has varied its bargaining techniques according to its general political and economic goals in the countries concerned. In dealing with the Western European nations the Soviet negotiators have proved to be tough, and in general they have received more than they have given.* They have been fairly successful in their efforts to exploit the intense competition that characterizes the commercial air industry in the Free World, particularly in Western Europe. The leverage obtained through this practice is aimed at exacting a balance of advantages for the USSR in any air agreements eventually concluded. It is also possible that public reiteration of the Soviet desire for reciprocal air services between Moscow and New York may be calculated to discredit the motives of the US in its current attempt to encourage its allies to pursue a common policy in confronting Soviet Bloc efforts to expand air relations with the Free World. Western Europe is an especially fertile ground for such a tactic. Superficially, however, the negotiations or overtures of the USSR in various parts of the world reflect a comprehensive international expansion program which results from a new confidence in the competitive capabilities of Aeroflot and is designed in time to place the Soviet carrier among the leading airlines of the world.

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* See particularly the 29 March 1958 agreement with Denmark (p. 70, below).

A. Expansion of International Air Relations.

1. Air Agreements Concluded With Countries of the Free World.

The first indications that the USSR was seriously interested in expanding its international air relations with the Free World were observed in the latter part of 1955, when, coincident with the development of the Tu-104, bilateral air transport agreements were concluded with Yugoslavia, Finland, and Austria. 358/ Early in the following year the USSR signed a bilateral agreement with Afghanistan and others simultaneously with Denmark, Norway, and Sweden. 359/ The arrangements with Yugoslavia, Finland, Austria, and Afghanistan, did not, however, actually extend the scope of operations of Aeroflot, which previously provided service between these countries and the USSR on a unilateral basis. The immediate significance of these agreements also has been limited by the failure of Yugoslavia, Austria, and Afghanistan to take advantage of their reciprocal air rights. 360/

Nevertheless, the granting of access to foreign aircraft to transit Soviet air space represented a radical change in the civil air policy of the USSR. In the case of Afghanistan, a non-Sino-Soviet Bloc country for the first time was permitted to transit a considerable portion of the USSR. Ariana, the Afghan carrier, was granted landing rights at Tashkent, Aktyubinsk, Moscow, and Leningrad, as well as transit privileges beyond, in return for similar concessions for Aeroflot at Mazar-i-Sharif, Kandahar, and Kabul.* A more liberal Soviet attitude was also reflected in a greater readiness to permit Aeroflot to enter interline agreements with airlines of the Free World. Before 1954 the only such cooperative arrangement by the Soviet carrier was concluded with the Scandinavian Airways System (SAS) in 1946 to provide for through ticketing and an interchange of passengers at Helsinki. Since 1954, Aeroflot has signed similar agreements with Air France, Air India International, British European Airways, Royal Dutch Airlines, Swissair, the Belgian carrier Sabena, Indian Airlines Corporation, Pan American World Airways, and, most recently, the West German carrier Lufthansa. Prague, Vienna, Kabul, and Helsinki are the usual exchange points, depending on the route pattern of the Free World carrier. 361/

The growing efforts of the USSR to expand its international air relations were noticeably impeded by the adverse reaction to Soviet intervention in Hungary in October 1956, especially in Western Europe. In the latter part of 1957, however, the interest of the Free World in

* The significance of this gesture is somewhat lessened, however, by the fact that for the foreseeable future a lack of qualified air crews will prevent Afghanistan from exploiting its rights in the USSR unless Soviet crews are used.

extending air service to Moscow revived strongly, and the UK, India, Belgium, the Netherlands, and France have since signed bilateral agreements with the USSR. The UK, after an indefinite postponement of negotiations in November 1956, opened formal discussions with representatives of Aeroflot in London on 9 December 1957. 362/ Negotiations went surprisingly well, and few of the anticipated Soviet objections to British proposals for arranging technical details materialized. 363/ As a result, an agreement, terminable by either party on 6 months notice, 364/ was signed on 19 December 1957. Under the terms of the arrangement, direct reciprocal air services are to be established by British European Airways and Aeroflot between London and Moscow with a technical stop at Copenhagen. The extent to which respective services beyond Moscow and London were discussed is not known, but a further extension of this route in the future is quite possible. The British Overseas Airways Corporation (BOAC) recently announced that it had requested the government to negotiate for rights across the USSR to Japan. 365/

Service on the London-Moscow route, which will be operated with Tu-104 aircraft and British Viscounts, is to begin only after each country is satisfied that there are such technical and commercial conditions as are necessary for safe, economical operations. Matters requiring further study by both sides include aircraft performance, navigational and airport facilities, routing, communications, traffic control procedures and systems, and commercial arrangements between carriers. 366/ A delegation of experts from the UK arrived in Moscow in mid-February to conduct various tests and to inspect airport facilities, 367/ but British officials believe it will be August or September 1958 before the multiplicity of technical problems can be sufficiently resolved to permit implementation of the agreement. 368/

The desirability of establishing direct air services between the USSR and India apparently was first discussed during the visit of Khrushchev and Bulganin to New Delhi in December 1955. 369/ Until recently, negotiations undertaken intermittently were unsuccessful because India feared Aeroflot would obtain the greater share of traffic in any reciprocal arrangement, especially as India would be competing with faster and larger Soviet turbine-engine equipment. Nevertheless, discussions were resumed again after the conclusion of the Anglo-Soviet air agreement, and, in spite of announced Indian expectations to the contrary, a bilateral agreement was signed in the latter part of February 1958. The earlier anxiety of India evidently was overcome by a Soviet concession to pool the revenues of the two carriers, thereby assuring the Indian airline of a fair level of earnings. 370/ The USSR also apparently avoided its original request for transit rights beyond New Delhi to Calcutta, with traffic rights onward to Rangoon, 371/ thus accommodating the reluctance of Indian Airways Corporation to share

traffic on its route to Burma. 372/ At any rate, Burma has not yet been approached by the USSR for landing rights at Rangoon, although the Soviet intention to do so has been reported. 373/

The agreement with India, signed on 2 June 1958, 374/ provides for weekly flights between New Delhi and Moscow by way of Tashkent, to begin on 15 August 1958. Aeroflot at first will employ the Tu-104, which subsequently will be replaced by the more efficient Il-18, and Air India International will operate Super-Constellations. 375/ To avoid overflight of Pakistan, with which the USSR has no air agreement, Soviet aircraft will be routed by way of Tibet. 376/ On the other hand, Indian aircraft will fly directly over Afghanistan and Pakistan. Although the proposed route over Tibet is less suitable, Soviet pilots are familiar with its requirements. The Tu-104 aircraft that carried the Soviet Olympic teams to Rangoon en route to Australia in the latter part of 1956 flew over the Pamir and the Himalaya Mountains between Tashkent and New Delhi. 377/

Belgium has attempted since the end of World War II to obtain an air agreement with the USSR, but until recently it was successful only in reaching an understanding in principle on reciprocal air services. 378/ On 19 May 1958, however, a Belgian-Soviet air agreement was initialed establishing direct air service between the two capitals. 379/ Sabena, the Belgian carrier, began weekly flights into Moscow with a DC-7C on 2 June, and Aeroflot began its scheduled twice-weekly flights with a Tu-104. 380/ Sabena has the right to fly twice weekly but was prevented from doing so at the beginning because of a temporary shortage of aircraft. 381/ This agreement differed from previous bilateral air agreements between the USSR and non-Soviet Bloc countries in that the Belgians persuaded the USSR to drop its insistence that all air crews flying into the USSR must be composed only of nationals of the two countries concerned. The Belgians received the right to staff their aircraft with the nationals of any nation already having a bilateral air agreement with the USSR. This right is important to Sabena, many of whose flying personnel are British. 382/

On 17 June a bilateral agreement with the Netherlands was signed at the Hague providing for air service between Moscow and Amsterdam by Aeroflot and the Royal Dutch Airline (KLM). Starting in late July 1958, KLM is to fly DC-6's to Moscow via Warsaw, and Aeroflot is to fly Tu-104's nonstop. Each airline will operate one flight a week, with the expectation of doubling the frequency by mid-1959. Under the agreement the USSR also received the rights of overflight and service stops on routes to Brussels and Paris, and KLM has permission to extend its Warsaw route on to Bucharest, flying over Soviet territory. Of particular interest in this agreement is the fact that the International Civil Aviation Organization (ICAO) is specifically mentioned, and it is provided that both parties will adhere to ICAO standards. 383/

A Franco-Soviet civil air transport agreement was signed on 26 June 1958 terminating negotiations begun 8 days before. Neither country yielded "beyond rights" through its capital. 384/

The UK-Soviet agreement, on the other hand, indicates that the confidence of the USSR in the ability of Aeroflot to compete with foreign airlines has grown substantially since the introduction of the Tu-104. As a result, the USSR now appears to be more amenable to granting greater reciprocal advantages, of the type normally found in bilateral arrangements among countries of the Free World. Of particular significance is the technical annex to the agreement with the UK in which the USSR has agreed, at least in principle, for purposes specified in the annex, to adhere to standards, procedures, and codes of ICAO. 385/ The USSR also has consented to conduct tests of the noise level of the powerplants of the Tu-104, contrary to the position taken in recent requests to use a New York airport, although it will not permit the British to examine the Tu-104 in detail. In the event that the Tu-104 does not meet the requirements of the UK in this respect, the USSR has indicated a willingness to adopt a new takeoff method or to attach a muffler apparatus to the jet aircraft and, if these expedients are unsatisfactory, to employ the Il-18 turboprop. In response to British dissatisfaction with the instrument landing system at Moscow, the USSR has agreed to install the type of equipment approved by ICAO and has requested to purchase it from the UK. 386/ Negotiations also disclosed that Aeroflot is less anxious about obtaining assured parity in the arrangements with non-Sino-Soviet Bloc carriers. One article of the UK-Soviet agreement, although providing for a predetermination of schedules and flight frequencies, recognizes that the capacity to be provided by each carrier shall be closely related to traffic requirements between London and Moscow. 387/ The agreements with India, Belgium, the Netherlands, and France also reflect a more confident and flexible attitude on the part of the USSR.

2. Negotiations for Air Rights in the Free World.

The successful conclusion of Soviet civil air negotiations with the Scandinavian countries in early 1956 stirred other countries of the Free World to consider the possibility of establishing direct air connections with the USSR. Since mid-1956, in Western Europe, varying degrees of interest have been shown by Belgium, France, and the Netherlands. Most recently, Soviet officials have expressed a desire to enter reciprocal arrangements with Switzerland and Italy. Overtures also have been made to various countries of the Middle East, but Soviet efforts have been discouraged thus far by the failure to obtain the permission of Greece to transit its air space regularly to serve the Arab states. Other offers of the USSR for air agreements have been extended to Iran

and Japan, thus far with little success. New York appears also to become more attractive to Aeroflot as the development of the long-range Tu-114 progresses. Recent intergovernmental negotiations on cultural and scientific exchanges between the US and the USSR included an agreement in principle to "establish on the basis of reciprocity direct air flights" between the two countries.

a. US and Western Europe.

In mid-1956, Soviet officials intimated to representatives of Pan American Airways (PAA), the only US carrier certificated to serve the USSR, that they were prepared to grant landing rights at Moscow without insisting on reciprocal rights for Aeroflot in the US. The offer, however, seems to have been a tactical maneuver undertaken only to determine the extent of US interest in establishing an air connection with the USSR. A nonreciprocal arrangement of this type would be entirely unprecedented in the policy of the USSR, which has zealously guarded its mutual rights. No such offer materialized during Soviet discussions with PAA in Moscow during late 1956, although an interline agreement was concluded with Aeroflot. 388/

Coincident with the development of modern aircraft, however, officials of Aeroflot have indicated a growing desire to extend Soviet air routes to New York. 389/ During recent negotiations on US-Soviet exchanges at Washington in November 1957 the Soviet ambassador raised the subject of reciprocal air service between the two countries. 390/ During discussions the US agreed to conduct negotiations at an unspecified later date on terms and conditions satisfactory to both parties. PAA also was approached again, in early January 1958, in an apparent attempt to ascertain the carrier's attitude toward serving Moscow. 391/ There also may be a more sinister basis for Soviet approaches to the US at the governmental level and to PAA. The US, having recently revised its civil aviation policy toward the Sino-Soviet Bloc in response to the growing Communist capabilities in this field, is currently attempting to persuade other countries of the Free World to pursue in common similar objectives in confronting pressures of the USSR to expand its international air network. In essence, this policy aims at obtaining substantial reciprocity in any air agreement with the Bloc as well as adherence to internationally accepted technical practices and rate structures. 392/ The possibility cannot be overlooked, therefore, that the USSR, knowing of US influence among the leading aviation nations of the Free World, may have made overtures to the US with the intention of prejudicing its motives abroad. If successful, other countries could more easily be induced for competitive reasons to accede to Soviet requests for bilateral air agreements, perhaps on terms most favorable to the USSR. Sensitivity is particularly acute among some of the NATO members. Resentment has smoldered in Italy and France against US airlines, which

are felt to be jeopardizing state carriers by unilateral competitive advantages obtained under existing bilateral agreements. 393/ Whether by Soviet design or not, therefore, some countries may feel that US policy on Soviet air expansion is a facade, intended primarily to maintain the dominant positions of US air carriers abroad. 394/

The Soviet proposal for direct air services between Italy and the USSR was made by the Soviet ambassador in December 1957, but thus far no concrete steps have been taken by either party to initiate formal discussions. 395/ Because of commercial pressures and the precedent established by France, Italy may find it impossible to refuse to negotiate an agreement with the USSR in spite of its reported reluctance to have the Communist airline serve Rome. 396/ Switzerland was approached for the first time in early March 1958. The USSR, [redacted] appeared most anxious to have Swissair exercise reciprocal rights to Moscow, but the airline reportedly lacks sufficient equipment to open a new route at present. 397/ 50X1

The negotiation of air agreements between the USSR and Western European nations, including the UK, has been seriously complicated by the division of Germany. In an effort to achieve international recognition of East German sovereignty, the USSR has insisted that Western European countries contemplating overflight of East Germany request permission directly from that government rather than from the Soviet occupation forces, as provided by quadripartite agreement. 398/ The problem is further complicated by the fact that, although the US, the UK, and France have relinquished much of their power to control overflights of West Germany by foreign aircraft, they still regulate, in agreement with the West German government, all traffic over its territory en route to or from the Berlin air corridors. The US, the UK, and France also control, in consultation with the West German government, all flights of Soviet aircraft over West Germany. 399/ Officials of the latter country have already indicated that the refusal of the USSR to permit aircraft of the West German air carrier Lufthansa to transit East German territory without the latter's consent would hamper negotiations for the right of overflight of Soviet aircraft over West Germany. 400/ Furthermore, before the USSR could obtain coordinated tripartite approval from the three Western European powers for overflight of West Germany, it presumably would have to grant certain benefits, perhaps including relinquishment of its efforts to achieve recognition for East Germany. 401/

To avoid these political ramifications, the recent bilateral air agreements provide for a technical stop at Copenhagen rather than Berlin, which would be more desirable to both parties. On 29 March 1958, after intermittent discussions, the Danish-Soviet agreement was expanded to permit Aeroflot to fly beyond Copenhagen to

the UK, France, the Netherlands, and Belgium. 402/ In return, Denmark, which at the outset demanded transit privileges beyond Moscow to Japan and India, 403/ acquired a new route to Rumania, Turkey, Lebanon, and the United Arab Republic by way of Warsaw, with the right to overfly Khust in a corner of European USSR. The USSR also will provide radio and meteorological aids in the Petropavlovsk region, a service which the Scandinavian airline, SAS, has not found necessary for its present polar flights to Tokyo. 404/ These would appear to be small concessions considering the advantageous bargaining position of Denmark in its negotiations with the USSR, which has limited its choice of routes to Western Europe by its unyielding attempts to obtain Free World recognition of East German sovereignty. Furthermore, the new Danish-Soviet agreement has facilitated similar agreements with the other nations of Western Europe.

b. Middle East.

The expansion of Soviet political and economic activities in the Middle East has been accompanied by efforts to establish direct air connections with Tehran, Cairo, Damascus, and Beirut, all of which lie on major air routes between Europe and Asia. Iran, aware of the threat of Soviet infiltration and with US encouragement, has been able to evade persistent attempts of the USSR to inaugurate air service to Tehran by proposing conditions as yet unacceptable in principle to the USSR. Thus the Soviet suggestion of 18 February 1957 for reciprocal services on a route between Tbilisi, Dzhul'fa, and the Iranian capital met with a counterproposal that provided, among other things, for an extension of the route to Moscow and for international arbitration of disputes. Iran also demanded that its airline have the right to use nationals of a third country because of the large percentage of US pilots employed by the Iranian Airways Company. 405/ Discussions have since continued intermittently, but the USSR thus far has adamantly refused to consider seriously the Iranian conditions. The latest counterproposal of Iran, submitted to the USSR in November 1957, did not contain a reference to the employment of foreign personnel. 406/ In subsequent negotiations, however, the Iranian representatives did not compromise their earlier position, 407/ to which the USSR remains opposed. 408/

The USSR also has proposed air agreements with Egypt, Syria, Lebanon, and Libya, but discussions appear to have been exploratory rather than formal. 409/ Lebanon and Libya 410/ already have refused these offers. Lebanon, in particular, fears Soviet penetration in the area and has firmly maintained its position during repeated Soviet approaches to permit Aeroflot to serve Beirut. 411/ It is unlikely, on the other hand, that the USSR will have any difficulty in persuading Egypt and Syria to conclude air agreements,

because of the expansion of technical and commercial relations between these countries. A Soviet official recently claimed that regular air service between Moscow and Cairo would soon begin, 412/ thereby implying that Aeroflot anticipates no difficulty in obtaining landing rights in Egypt.

Attempts of the USSR to extend its air routes to the Middle East, however, thus far have been seriously delayed by the refusal of Greece to permit Soviet aircraft to overfly its territory on a scheduled basis. Since early May 1957 the USSR has made persistent requests to Greece for transit and technical landing rights. 413/ Greece at first was willing to accede to Soviet requests, provided the USSR concluded an air agreement granting reciprocal rights on a route between Athens and Moscow and beyond. Greece also demanded permission for its airline to employ foreign crews on Greek aircraft, some of which are operated on charter from other countries. The USSR, in refusing to accept the latter provision, offered instead to provide aircraft and crews for flights into Soviet territory, but this impractical arrangement was immediately rejected by Greece. 414/ Fearing that the desire of the USSR to penetrate the Middle East would ultimately lead it to accept all precedent conditions, Greece subsequently revised its counterproposal to provide for reciprocal air service between Moscow and Athens with no transit rights beyond either terminal. Soviet officials have been unwilling to negotiate on these terms, because Aeroflot is interested mainly in transit privileges. 415/ The USSR has not pressed for further discussions, but it has made repeated requests for commercial overflight privileges for individual aircraft en route to the Middle East, in a rather obvious attempt to establish a precedent whereby it will be more difficult for Greece to refuse Soviet terms. 416/

The failure to obtain rights to overfly Greece, although delaying the expansion of Aeroflot, may not prevent an extension of Soviet air routes to the Middle East. The USSR could, and previously intimated it would if necessary, use an airport in Albania as an intermediate terminal on routes to Arab capitals if refused access to Athens. The recent extension of an airfield near Tirana to meet the requirements of jet transport aircraft may have been undertaken with this alternative routing in mind. 417/ Aeroflot now has the privilege to overfly Yugoslavia on its route into Albania, and, if required, it probably can obtain any additional rights from either country for service beyond to the Middle East. 418/

c. Far East.

Japan is the only Free World country in the Far East with which the USSR up to now has shown an interest in negotiating an

air transport agreement. After some preliminary exchanges in April 1957, 419/ a nonofficial Japanese delegation visiting Moscow in October was presented with a draft agreement that proposed mutual air service between Khabarovsk and Tokyo. 420/ Japan, however, has not been receptive to the Soviet route demands and has taken the position that air rights would have to be granted between capitals to be truly reciprocal. Any other arrangement granting traffic rights only at an intermediate point would give Aeroflot, with its connections in Moscow and Europe, too great a competitive advantage to be economically feasible for the Japanese air carrier. 421/ The latest proposal for a bilateral air agreement was presented to the Japanese government on 22 March 1958, following repeated public references by the USSR to its intention to extend the recently acquired London-Moscow route to Tokyo. 422/ In spite of Soviet pressure, however, Japan remains firm in its intention to demand reciprocal rights to Moscow or beyond in any future negotiations. 423/

B. Attitude Toward International Civil Aviation Organizations.

Soviet civil air policy thus far has been pursued completely outside of the multilateral arrangements created by nations of the Free World to govern international air transport after World War II. Before 1954, there actually was little reason for the USSR to become a member of ICAO, a specialized agency of the UN concerned with the standardization of civil aviation practices through multilateral agreement, or for Aeroflot to join such airline groups as IATA, an industry affiliation of major scheduled air carriers created to establish uniform tariffs and to cope with common traffic and technical problems. In addition to its complete lack of interest in expanding international air service, the USSR opposed in principle the liberal provisions of ICAO, some of which grant the right of air transit over the territories of contracting parties under specified conditions and involve international inspection of civil air facilities. In large part, this attitude could be attributed to a serious lack of competitive aircraft in the USSR; to the general inefficiency of its civil aviation; and to its extreme sensitivity, for security reasons, to overflight by foreign aircraft. 424/ Furthermore, the USSR probably recognized that its flexibility in pursuing an expansionist air policy would be limited to some extent by adherence to the principles of reciprocity advocated by ICAO.

The recent growth in international air relations of the USSR now logically raises the prospect of Soviet participation in ICAO and IATA. This question was discussed during the recent negotiations with the British, and the USSR indicated that it may join ICAO at an unspecified future date. 425/ Many of the factors preventing Soviet cooperation with the Free World in the past are no longer relevant, at

least in the same degree. Aeroflot is no longer embarrassed by inferior aircraft, and the Soviet government seems less anxious about having prying foreigners in the country. It is also evident that ICAO and IATA are being studied by Soviet officials to determine the extent to which these organizations could be used to foster the expansion and modernization of Aeroflot. 426/ The USSR already is familiar with the deliberations of ICAO, for it attended the technical meetings of that organization in 1951 and 1954 and sent observers to the ICAO assembly in Caracas in 1956. 427/ Aeroflot has been adopting gradually many Free World airline practices and has asserted its intention to conform eventually to all international technical recommendations. 428/ Thus the Soviet carrier now uses the IATA ticket, 429/ has reduced fares for round trips, and has granted a higher free-baggage differential on international flights. 430/ While in the Hague for the negotiations with the Netherlands, Marshal Zhigarev, the head of Aeroflot, told the press that Aeroflot "hopes shortly" to become a member of IATA. 431/

At the moment, however, it is impossible to ascertain whether Soviet interest in ICAO and IATA reflects a sincere intention to become affiliated with either of these organizations or whether this interest merely affords a convenient means of obtaining the benefits of the experience of the Free World in civil aviation techniques. The failure to participate in either ICAO or IATA thus far has not been a serious obstacle to Soviet efforts to obtain air agreements with the Free World. About the only real advantage that the USSR would obtain by participation in ICAO would be derived from the accompanying right to sign the International Air Services Transit Agreement. Under the provisions of this compact, each contracting country grants to other signatories the so-called "Two Freedoms" -- the right to fly across its territory without landing and the privilege of landing for nontraffic purposes. 432/ As of November 1957 a total of 54 countries signed this agreement, and 46 countries, including the US, Denmark, Greece, India, and Burma, had ratified it. 433/ Consequently, the adherence of the USSR to the transit agreement not only would facilitate Soviet negotiations for technical landing rights in Copenhagen and Greece but also would pave the way for an extension of the operations of Aeroflot to South and Southeast Asia.

Conversely, the USSR would be compelled to open its territory to overflight for nontraffic purposes by foreign airlines, many of which are anxious for the opportunity. By its own admission the USSR is technically unable to provide the navigational facilities for transiting vast areas of the country. Actually, however, this excuse probably masks a real intention to prevent the exploitation by foreign air carriers of the strategic geographic position of the USSR astride the shortest great circle route between Europe and the Far East. Soviet officials apparently feel that the balance of advantages in such an arrangement would favor the airlines of the Free World, which, for the

moment at least, are still better equipped than Aeroflot to provide long-haul service. There is, moreover, no immediate pressure on the USSR to affiliate with ICAO or IATA. As long as it is willing to adhere to generally accepted principles of reciprocity, such as those contained in the UK-Soviet agreement, the USSR can rely on the competitive environment in the Free World to gain its objectives in international civil aviation. Once it has stabilized the position of Aeroflot in peripheral countries of Western Europe, Asia, and the Far East, the USSR may be more amenable to joining ICAO, although it is unlikely that it will even then sign the International Air Services Transit Agreement.

III. Competitive Aspects of Civil Air Expansion.

The expansion of the Soviet international air network is not based entirely on the desire of the USSR to normalize another aspect of its relations with the Free World, although this impression is being assiduously fostered abroad. It is becoming increasingly evident that Aeroflot also is being girded as a political instrument of the Soviet policy for global competition with the Free World. One facet of this policy -- perhaps the most important over the long term -- is a reflection of the ubiquitous ideological struggle between Communist and free societies. The US has become accustomed to Soviet efforts to dislodge its long-established influence in civil aviation among nations of the Free World, particularly in the underdeveloped areas where, through technical assistance and aircraft sales, the USSR has had some success in encouraging respect for and dependence on Soviet technology. Thus far the USSR has been handicapped by the glaring inferiorities of its own civil aviation and the preeminence of US aircraft manufacturers and airlines. One of the principal impediments to Soviet efforts to penetrate the Middle East and South Asia, however, the lack of competitive aircraft, is rapidly being eliminated by the production of modern turbine-engine aircraft which, superficially at least, compare favorably with those being developed in the Free World. If the new Soviet jets and turboprops are as reliably engineered as claimed, the aircraft manufacturers of the US, the UK, and France soon may be confronted with a declining market, not only in the underdeveloped nations but also in countries more sophisticated in civil aviation, particularly if the USSR chooses to sell at bargain prices.

Soviet air policy, although not basically motivated by economic considerations, also will involve commercial competition between Aeroflot and the airlines of the Free World for passenger traffic. Soviet tactics indicate that the USSR, by virtue of its advantageous geographic position astride the shortest air route between Europe and the Far East, intends to establish Aeroflot as a major link between these areas. With competitive, reliable aircraft being introduced into service, the only apparent obstacle to be overcome is the unfavorable reputation of the Soviet air carrier. Admittedly, the passenger service provided by Aeroflot is far below Free World standards and is universally criticized by both foreigners and Russians. It would be unwise to assume, however, that the Soviet airline will not eventually master the art of catering to sophisticated tastes, especially because it has shown a tendency to assimilate at every opportunity the experience of associated airlines of the Free World. Aeroflot already has made noticeable improvements, not only in passenger service but also in the interior designs of its newer aircraft, which reflect an awareness of the subtleties of customer appeal. There is every reason to believe, therefore, that the Soviet air carrier will emerge in the near

future as a strong contender for international air traffic in Europe and Asia.

A. Penetration of Civil Aviation in Underdeveloped Areas.

The efforts of the USSR to extend its international air network have been accompanied by a concerted program to dislodge Free World influence in civil aviation in the underdeveloped areas of the world, where the deficiencies of the Soviet civil air system appear less obvious. Thus far the Soviet campaign, although modest in terms of investment, has been rather remarkable in scope. Almost every one of the politically uncommitted nations of the Middle East and South Asia has been the object of at least a gesture of affluent good will if not a target of active infiltration. Gifts of aircraft have been a popular and relatively inexpensive means of acquainting the underdeveloped areas with the technological progress of the USSR. Models of the latest piston-engine aircraft, the Il-14, have been given to the rulers of Burma, 434/ Iran, 435/ Egypt, 436/ India, 437/ and Indonesia. 438/ It seems clear that the aim of this beneficence is to encourage sales among aspiring indigeneous airlines, thereby creating a requirement for Soviet technicians and instructors in the recipient country and establishing a long-term dependence on the USSR for aircraft repairs and spare parts.

The USSR has been particularly interested in having India rely on the Soviet aircraft industry for its reequipment program. A proposal to sell Soviet aircraft to India was first made in early 1955 during a visit by Mikoyan, who was then on a trade tour of Asia. 439/ The Soviet promise of fast delivery, low price, and adequate performance 440/ led to negotiations in the following year and to the subsequent acceptance by India of 12 Il-14 aircraft at US $250,000 each. 441/ India insisted, however, that the first few aircraft be taken on trial, with a guaranteed refund if their performance was unsatisfactory. 442/ The USSR, reluctant to suffer the embarrassment of such an eventuality, was unwilling to approve the arrangement. After much hesitation, Soviet technicians instead provided certain specifications, the analysis of which revealed that the cost of operating an Il-14 is about twice that of the DC-3. 443/ Maintenance costs were estimated by the Indian Airlines Corporation to be approximately 60 percent greater for the Soviet aircraft than for the DC-3. 444/ As a result, the Indian government canceled the agreement, preferring instead to obtain the more efficient equipment manufactured in the Free World in spite of its higher initial cost. 445/

Soviet efforts have been considerably more successful in Egypt and Syria, which have become increasingly dependent on the USSR for economic and military support. Egypt has received under a contractual

arrangement a number of Il-14 aircraft, although these have been assigned to military rather than civil employment. 446/ More recently the USSR has been able to exploit adroitly a combination of unfortunate circumstances to penetrate civil aviation in Syria. The poor condition of the DC-3 and DC-4 aircraft operated by the Syrian airline became critical in the latter part of 1957 because of an inability to purchase spare parts from the US, which embargoes the export of such commodities to the Middle East area. 447/ As a result, Syria turned to the USSR for assistance and promptly was sold two Il-14 aircraft for civil use and given another as a gift for President Quwatli. 448/ At the same time, the loss by the Syrian airline of several Greek and US pilots without suitable replacements 449/ may provide the USSR an opportunity to offer Soviet pilots until Syrians can be trained in Il-14 operations. 450/

Syria does not appear to be as concerned as India about efficient civil air operations, for it continues to be interested in acquiring additional Soviet aircraft in spite of the fact that the Il-14 was found to be uneconomical for short hauls and lacking in capacity for longer flights. 451/ Furthermore, it has been rumored that a delegation headed by the director of Syrian Airways was in Moscow in early February 1958 to discuss a merger with Aeroflot, which offered to purchase a 48-percent interest in the enterprise. 452/ The Soviet contribution probably would be in the form of aircraft, including the newer types suitable for regional operations in the Middle East. At the moment the consummation of such a deal probably would be prevented by the opposition of Egypt, which apparently fears that the standardization of the Syrian air carrier on Soviet equipment would jeopardize its prospective merger with the Egyptian airline. 453/ Nevertheless, the Soviet offer suggests an eventuality toward which an unwary airline might be led by indiscriminate reliance on the USSR for technical advice and equipment.

Elsewhere in the underdeveloped areas the USSR has undertaken to contribute technical advice and resources for the construction of civil aviation facilities. Airfield development in Afghanistan, under a technical assistance agreement with the USSR, has provided an opportunity to send numerous Soviet engineers and aviation experts to that country. 454/ The same is true of Yemen, where the USSR recently completed renovating an airport south of the capital. The recent departure of the Swedish personnel who operated the small domestic airline has created the added danger that Yemen also will turn to the USSR for pilots and civil aircraft. 455/

The success of Soviet attempts to infiltrate civil aviation in the Free World, especially through the sale of aircraft at attractive prices, has been severely limited by the inferiority of the product it has marketed, even in countries with little resources for capital investment. At the moment, however, the Soviet aircraft industry is

producing first-line equipment of much greater efficiency and capacity which, if reliably engineered, may appeal to advanced as well as underdeveloped countries. The new Soviet turboprop aircraft, in particular, are likely to be attractive to airlines having a requirement for equipment that is relatively inexpensive to operate; flexible in range; and capable of use from short, unimproved airfields. Consequently, aircraft manufactures in the Free World, especially in the US and the UK, which dominate the world market, are likely to be confronted in the near future with considerable competition from the USSR. There already is some concern that, even without considering the Soviet aircraft industry, Free World manufacturers in the aggregate may produce more turbine-engine aircraft than can be supported by anticipated traffic levels. This possibility is particularly serious, one analysis found, in the market for medium-range transports such as the British Comet 4B, Brittania, and Vanguard; the French Caravelles; and the US Electra, Convair 880, and Boeing 720. 456/ If this analysis is reliable, the advent of substantial sales of the Tu-104, the Tu-110, the An-10, and the Il-18 -- all medium-range Soviet aircraft -- may make it difficult for Free World manufacturers to market a wide variety of transports in sufficient volume even to meet development and production costs.

Of particular concern is the fact that, in addition to the technical resources necessary to compete with the Free World, the USSR has the ability with a controlled economy to price its production below cost, at levels which private enterprise could not profitably meet. There is enough evidence to suggest that the USSR may well intend to engage in a ruinous price war in competing with the Free World for aircraft sales. The prices of US $1 million 457/ to $1.2 million 458/ quoted for the Tu-104 are less than half those at which similar aircraft being developed in the US and UK will be marketed. 459/ In spite of the low price, prospective purchases in the Free World have been reluctant to accept the Soviet jet, because of its operating deficiencies.* Buyer resistance may not be so great, however, if other modern Soviet transports can be demonstrated to be efficient and also are offered at bargain prices under long-term financing arrangements, particularly because they will probably be available for export before comparable Free World models. The wide publicity given by the USSR to its new jet and turboprop aircraft in the press and at the International Exposition held in Brussels from May to October 1958 461/ may well be the first phase of a Soviet campaign to exert a maximum influence in international civil aviation through aircraft sales and accompanying technical assistance. Advance announcements of the huge Tu-114 turboprop as well as the Soviet

* Only Czechoslovakia, which is barred from purchases of aircraft outside the Soviet Bloc, has been willing to buy the Tu-104, but at a price three times that quoted in Soviet offers to the Free World. 460/

medium-range transports have persistently emphasized passenger-mile economy and operational flexibility -- important factors that appeal to all efficiently managed airlines. 462/

As long as the USSR maintains an aura of international respectability, the spread of its influence in civil aviation in the Free World will be difficult to prevent, not only in the underdeveloped areas where economic or political crises continue to create opportunities for penetration but also in countries not normally considered vulnerable to Soviet blandishments. For example, the salary dispute between the domestic airline in Ethiopia and its US pilots could lead to a virtual cessation of air service if not satisfactorily resolved and thus could provide an opportunity for the USSR to offer assistance in maintaining air operations in the country. 463/ Similarly, the political crisis in Indonesia has made civil aviation in that country particularly vulnerable to Soviet penetration in spite of its preferred association with Dutch and US technical assistance. The desire to eliminate foreign influence in Indonesia has led to the cancellation of a contract of the Royal Dutch Airlines (KLM) to provide technical assistance to Garuda, the domestic air carrier. 464/ As a result, the services of many of the Dutch technicians and pilots, who in large part operated Garuda, have been lost. With few Indonesian nationals of adequate experience available as replacements, the Indonesian air carrier has been forced to reduce the scope of its operations. At the same time, Indonesia is attempting to obtain civil aircraft from the US to expand the international services of Garuda, but negotiations have been protracted by the present crisis. 465/ Thus far, Indonesia has not requested assistance from the USSR, but Garuda is a favorite project of the Indonesian President, who probably would go to extremes to prevent its dissolution. 466/ It does not appear likely, therefore, that Indonesia will be reluctant to accept civil aviation equipment and technicians from the USSR if it has no palatable alternatives, especially considering the fact that it has already obtained Soviet aid to maintain interisland shipping services. 467/

The USSR is not standing idly by waiting for opportunities to penetrate civil aviation in the underdeveloped areas of the world. Articles recently appearing in Grazhdanskaya aviatsiya, the official organ of Aeroflot, indicate that it is actively seeking to create exploitable situations. Thus "capitalist" airlines of the US, the UK, and France not only are accused of taking advantage of taxpayers through hidden government subsidies but also are criticized for unfairly exploiting their personnel. Perhaps most significant is the Soviet advice to native employees in Asia and Africa to "struggle against the clear discrimination of American, British, and French airlines, who pay their colored workers one-sixth to one-eighth the wages of white employees." 468/ The propagation of such invidious propaganda, by disturbing labor-management relations between such airlines

as TWA, PAA, BOAC, and Air France and their indigenous employees, seems calculated to stir resistence to the foreign operations of these carriers, thus creating a vacuum which can be filled by the USSR.

B. Competition with Free World Airlines.

1. Transport Aircraft.

The unveiling of a variety of new aircraft in the USSR has rather abruptly focused the attention of the aeronautical world on the Soviet aircraft industry, particularly in its relation to new transport aircraft designed in the Free World. It is noteworthy that the USSR thus far has confined its designs of commercial jets to medium-range aircraft and has concentrated on turboprops, with which Soviet designers are very familiar, for shorter and longer range aircraft. Contrary to their US counterparts, Soviet designers apparently feel that over very long distances the turbojet is too expensive to operate and that over short distances its greater speed is a minor advantage which, in any case, is difficult to exploit economically. On this basis, therefore, the USSR seems to have concluded that the turbojet is suitable primarily for stages of between 1,000 and 1,500 nautical miles, where the cost differential is at a minimum. 469/

A rather superficial comparison with the performance characteristics of turbine-engine equipment being developed in the Free World (see Figure 6* 470/) suggests that the new Soviet aircraft have been adequately designed for their intended assignments. The only apparent exception is the Tu-104, which, in spite of the propaganda gains that it may have achieved, does not qualify as a commercial transport. The Free World aircraft most closely resembling the Tu-104 is the twin-jet Caravelle, which is being produced in France and is expected to go into scheduled service with Air France in 1958. 471/ The Tu-104 is a considerably larger transport, with almost twice the power and 70 percent greater gross weight than the Caravelle. Furthermore, although cruising speeds of both aircraft are about the same, the Tu-104 has an appreciably greater range. The Caravelle, however, has only a slightly lower payload capacity and can carry from 10 to 14 more passengers in the tourist and standard versions, respectively. The inferior ratio of useful load to gross weight of the Tu-104, in spite of its relatively enormous power, provides a good explanation of the aircraft's unsatisfactory commercial performance. In terms of efficiency, this ratio means that the rate of fuel consumption of the Tu-104 (a large item of operating expense) is approximately twice that of the Caravelle. 472/

* Following p. 82.

Figure 6

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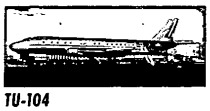
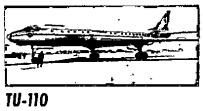
COMPARISON OF SOVIET AND FREE WORLD TURBINE AIRCRAFT

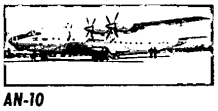
1957



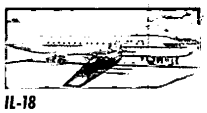
TU-104



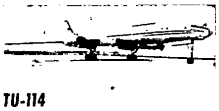
TU-110



AN-10



IL-18



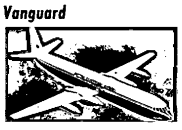
TU-114

Characteristic	TU-104	Caravelle	TU-110	Convair 880	AN-10	Vanguard	IL-18	Electra	TU-114	Boeing 707
Engines	2 turbojet	2 turbojet	4 turbojet	4 turbojet	4 turboprop	4 turboprop	4 turboprop	4 turboprop	4 turboprop	4 turbojet
Total Power (hp=horsepower; lbs=pounds thrust)	39,600 lbs	22,000 lbs	48,000 lbs	47,200 lbs	16,000 hp	16,080 hp	16,000 hp	15,000 hp	48,000 hp	66,000 lbs
Span (ft)	114	112.5	121.9	120	120	118	124	99	155	142.4
Length (ft)	128.5	104.7	129.6	129.3	110	122	116	104.5	177	152.9
Gross Weight (lbs)	163,900	94,000	173,500	178,500	112,400	141,000	128,000	113,000	414,000	295,000
Payload Capacity (lbs)	19,800	19,840	24,000	23,150	28,700	25,000	31,000	26,500	39,700	40,000
Passenger Capacity:										
Standard Version	50	64	78	88	84	96	75	66	120	131
Tourist Version	70	80	100	109	126	138	100	85	170-220	162
Range with Payload (Nautical Miles)	1,600	1,250	1,850	2,600	1,080	2,275	1,080	2,380	5,400	4,160
Cruising Speed (knots)	430	430	425	445	325	380	325-350	350	485	515
Cruising Altitude (ft)	33,000	30-40,000	36,000	35,000	26-33,000	25,000	26-33,000	25,000	30,000	35,000

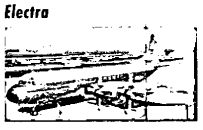
Caravelle

Convair 880

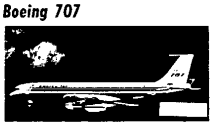
Vanguard



Electra



Boeing 707



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The Free World counterpart of the Tu-110 is the US Convair 880. Although the aircraft differ markedly in external configuration, they possess virtually identical dimensions, power, maximum weight, and payload capacity. The only noteworthy differences are the appreciably greater range and the high-density seating arrangements in the standard and tourist variants of the Convair 880, which may provide for more economical operations.

The An-10 and the Il-18 evidently have been designed to meet requirements very similar to those for which the Vickers-Armstrong Vanguard and the Lockheed Electra are being developed. In configuration the An-10 looks more like the C-133A, a high-wing turboprop transport being developed by Douglas for the US Air Force. Its characteristics, however, are more similar to those of the Vanguard. The most significant difference between the aircraft is the more favorable ratio of payload to gross weight of the An-10, although this has been achieved at the expense of range. On the other hand, the Vanguard possesses a greater cruising speed and, with a more advantageous use of interior capacity, can carry 12 more passengers in the standard and tourist variants than the An-10.

The close resemblance of the Il-18 and the Electra extends not only to dimensions, weights, and performance in general but also to external appearance. Soviet statements have claimed, without citing specific aspects of performance, that the Il-18 is superior to the Electra. 473/ The only noticeable difference, however, arises from the fact that the Soviet design has been optimized to a shorter range and therefore will carry a greater payload. It is also possible that the Soviet claim referred to the impressively short takeoff distance required by the Il-18, which is less than half that necessary for the Electra. 474/ In meeting the Soviet need for an aircraft with rough-field capability, the Il-18 also will certainly appeal to the underdeveloped countries which have similar requirements.

Too little is known of the important characteristics of the Tu-114 to be able to judge its relative performance potential with satisfactory accuracy. It seems clear, however, that the 12,000-hp engines that power the aircraft present a considerable lead over the Free World in turboprop development. 475/ The Tu-114, moreover, is a considerably larger aircraft than those under development elsewhere in the world. Its closest counterparts in size are the intercontinental versions of the four-jet Boeing 707 and Douglas DC-8 being manufactured in the US. Fully loaded, however, the Tu-114 will take off at 414,000 pounds, or 119,000 pounds heavier than the largest Boeing 707. Moreover, the Tu-114 concedes little in speed to the big jet transports -- it will cruise at 485 knots compared with 515 knots for the Boeing 707.

Consequently, the Soviet model appears to offer a greater payload-range performance. In addition to being capable of carrying approximately the same payload more than 1,200 nautical miles farther than the Boeing 707, the Tu-114 can be equipped to accommodate as many as 220 passengers on shorter hauls, which are relatively more economical for a turboprop aircraft. By comparison, the Boeing 707 will seat 162 passengers in a high-density version.

Unfortunately, a lack of precise information on operating costs prevents a more critical individual assessment of the comparative performance of the new Soviet aircraft. It seems clear, however, that, in contrast to the obvious inferiority of the piston-engine equipment employed by Aeroflot, the jet and turboprop transports being manufactured in the USSR possess certain characteristics that compare favorably with those of similar aircraft under development in the Free World. For the first time, moreover, Soviet designers have made a systematic effort to reduce aircraft weight, discarding the heavy, ornate interior furnishings normally found in the equipment of Aeroflot for foam rubber, lightweight metals, and plastics. The commercial attractiveness of the new Soviet aircraft also has been enhanced by devoting greater attention to fuselage layout as well as to cargo and baggage compartment accessibility, in order to facilitate efficient ground servicing. The USSR has learned well from the Free World the subtleties of customer appeal in designing competitive transports.

2. Airline Service.

Aeroflot certainly will require more than efficient modern aircraft to attract customers to Soviet airlines from the airlines of the Free World. Competition on the major world routes today is intense and is based as much on service, promotion, passenger relations, and scheduling as it is on equipment. The managers of the Soviet civil air fleet, which serves a largely unsophisticated clientele, generally have cared little for the welfare of air passengers. As a result, there has been very little praise and virtually universal condemnation by both Russians and foreigners of the service provided by Aeroflot. Typical comments of those who have flown commercially in the USSR are summarized in the recent statement of an irate foreigner that "Aeroflot is without exception the worst airline in the world." 476/

The most common criticisms of Aeroflot indicate that seat belts are considered an unnecessary annoyance, and even when provided in Soviet aircraft their use is not mandatory, much less encouraged. Cabins generally are not heated before takeoff, even in below zero weather, causing much discomfort until the aircraft attains the required elevation. 477/ The stewardess, if one is carried, frequently is not in uniform, usually is oblivious of the passengers, and normally

is superfluous because no meals or snacks are served aloft. Ground service is not much better. Meals, which must be taken at stops en route, are served at the passenger's expense at inhospitable restaurants. 478/ At Soviet airports, passenger processing is slow, and reservations can be made no longer than 10 days in advance. 479/ A crude through-ticketing system often compels passengers to buy at considerable inconvenience a second ticket while en route in order to complete their itinerary, 480/ and the frequent failure to communicate changes in flight schedules between territorial units creates confusion among travelers and ground personnel. 481/

The catering techniques of Aeroflot must certainly be considered backward, and they continue to be the subject of much criticism even within the USSR, 482/ but the urgent need for improvement to accompany the introduction of modern aircraft is realized. 483/ For some time, officials of the Soviet civil air fleet have been studying at every opportunity the organization and methods of advanced airlines. Aeroflot seems particularly interested in booking and scheduling arrangements as well as passenger ground service, in-flight refreshments, and other important conveniences that attract air travelers. 484/ More recently a widespread campaign has been undertaken to improve the reputation of Aeroflot. Air travel agencies are being enlarged and are being accessibly located at shopping centers, at bus and railroad terminals, and at most hotels. 485/ Efforts are being made to expedite passenger handling and to promote air travel by advertising on radio and television and through movie shorts which are displayed throughout the country. 486/ Soviet magazines now run full-page color advertisements depicting the pleasures and conveniences of air travel, and attractive brochures and timetables are being distributed to stimulate an interest in Aeroflot. 487/

Aeroflot also is attempting to make a good impression on foreigners. For example, pleasant multilingual personnel are available at Riga, a gateway stop, to assist passengers through the border routine. Aeroflot crews, once noted for their complete indifference to their passengers, now provide information on flight progress on Scandinavian routes in both Russian and English. 488/ Equally important, the new Soviet aircraft are being equipped to appeal to the discerning air traveler. Pressurized, air conditioned cabins are furnished in the modern manner in pastel colors and have comfortable adjustable seats, equipped with reading lamps, ventilating nozzles, and call buttons. Seat belts also have been installed, although merely as a sop to foreign passengers. 489/ Apparently, complete galleys are not available aboard the new Soviet aircraft for the preparation of full-course meals. The An-10 not only has individual radio headphones at each seat but also has a fully equipped play section for children. 490/

Considerable attention also is being given to punctuality. Whereas schedules were once erratic and subject to the whim of both weather and pilot, 491/ the Tu-104 has become noted for its regularity, at least outside the USSR. 492/ Furthermore, in spite of the crudities that still exist, air travel in the USSR seems reasonably safe. The most frequent criticism of Soviet pilots is their proclivity for taking off and landing rather abruptly, thus causing considerable discomfort. 493/ Contrary to the popular belief that Soviet aircraft are flown at tree-top level, however, the pilots on scheduled Aeroflot routes generally are conservative and, after the first few faint moments of a flight, inspire confidence among the passengers. As a result, an Aeroflot official could claim recently that air transport is the safest means of travel in the USSR. 494/ It is difficult to judge the reliability of this statement, because the USSR does not publicize aircraft accidents unless they involve foreigners or occur on international flights. Since 1952, when 70 persons were killed in the crash of a Soviet troop transport and an Il-12 at Moscow, 495/ there are known to have been 5 serious accidents involving Il-14 aircraft, 3 within the USSR 496/ and 1 each at Copenhagen 497/ and Helsinki. 498/ Doubtless other accidents also have occurred, but, considering the growing number of foreigners traveling by air throughout the USSR, the safety record of Aeroflot cannot be considered noticeably bad. In any case, the greater use of modern aircraft and of advanced devices for traffic control should be accompanied by improvements in flight safety. The Tu-104, for example, has been operating domestically and internationally since May 1956 and, so far as is known, has had no serious accidents, although it has had two engine failures 499/ and has twice overshot the runway at Prague during bad weather. 500/

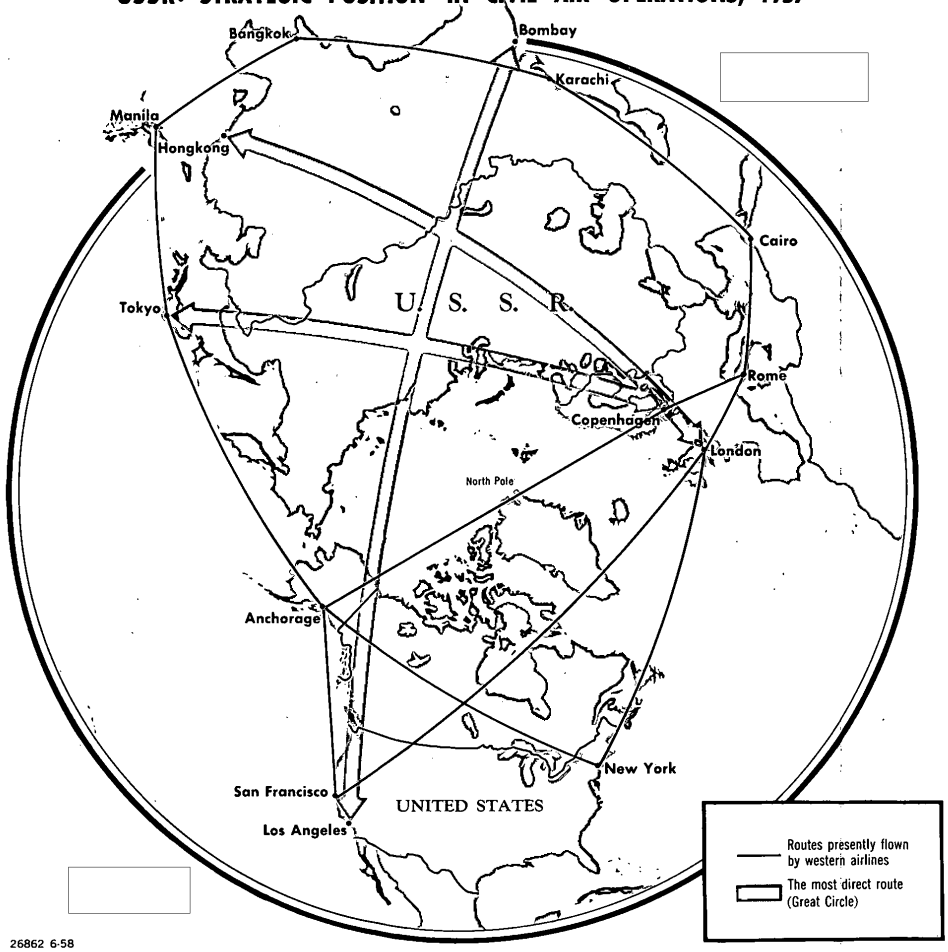
3. Geographic Advantages.

The USSR, with modern aircraft and the capability for emulating the high standards of passenger service offered by Free World airlines, will soon be in a favorable position to compete for international air traffic. In particular, Aeroflot will be a strong contender for traffic between Europe and the Far East, by virtue of the geographic position of the USSR astride the shortest great circle route between these areas. Free World air carriers, long cognizant of this characteristic of Soviet geography, have been anxious to serve Moscow because the right of entry there would facilitate future negotiations for transit rights beyond the Soviet capital. The attractions of Soviet air space to countries of Western Europe, and to a lesser extent to the US, are certainly impressive, at least in terms of flight distances (see Figure 7*). Free World airlines operating between Europe and the Far East as well as Oceania now overfly South Asia or the North Pole on rather extended

* Following p. 86.

Figure 7

USSR: STRATEGIC POSITION IN CIVIL AIR OPERATIONS, 1957



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routes. For example, an SAS flight between Copenhagen and Tokyo by way of South Asia covers 8,960 nautical miles and requires 52 hours, and the airline's recently inaugurated polar flight of 6,950 nautical miles takes approximately 30 hours by way of Anchorage. 501/ On the other hand, SAS has estimated that a flight between Copenhagen and Tokyo by way of Igarka would take only 17 hours, 502/ or a little more than half the time required for its present polar schedule and approximately one-third the flight time by way of South Asia. The schedules of other carriers operating between Europe and the Far East would be similarly improved if traffic could be routed across the USSR.

For this very reason, however, it is unlikely that in the near future the USSR will permit foreign airlines to transit its territory from east to west in competition with Aeroflot. On the contrary, Soviet tactics in negotiating international air agreements suggest that, by extending its air relations to peripheral countries and permitting only limited penetration of its air space, the USSR intends to establish Aeroflot as the major carrier between Europe and the Far East.

Unfortunately, there is no way of determining the potential commercial value of a transcontinental Soviet route between Europe and the Far East, because data on the aggregate requirement for through air traffic between these points are not available. There is, however, some indication that the requirement may be significant and growing. SAS, for example, expected to carry 10,000 passengers during the first year of operation of its polar route between Copenhagen and Tokyo 503/ but has since found it necessary to increase its twice-weekly schedule to 3 flights per week in each direction. 504/ Furthermore, SAS and other Free World carriers (BOAC, Air France, KLM, Swissair, PAA, and TWA) schedule about 30 trips weekly in each direction between European capitals and such Far Eastern centers as Tokyo, Manila, and Hong Kong, 505/ although the extent of through traffic on these routes is not known. Nevertheless, the lively interest among airlines of Western Europe in extending their service beyond Moscow, with little prospect of acquiring traffic rights at intermediate Soviet cities, suggests that there is a significant potential for a through express route between Europe and the Far East. Other things being equal, the air carriers of the Free World now serving these areas would find it difficult to compete with the faster service Aeroflot could provide, particularly if the Soviet carrier decided to exploit its position outside of IATA by offering air transportation at bargain prices. Furthermore, the advantages of Soviet geography will surely grow in economic importance with the expansion of commercial and cultural contacts between Communist China and the Free World. In a sense, therefore, the USSR possesses the future Gibraltars and Singapores of the coming era of civil aviation.

IV. Conclusions.

The Soviet civil air system for many years has languished in economic neglect and virtual isolation because the policy of the USSR was to devote its limited resources to developing a tactical and strategic air force. The accomplishment of this goal and the substitution of international affability for the profound distrust of the Free World that characterized Soviet policy before the death of Stalin has led naturally to a significant new emphasis on civil aviation, which is now recognized by the USSR as a valuable tool in achieving political objectives abroad. As a result, the modernization of Soviet aircraft and airways is being accompanied by strenuous efforts on the part of the USSR to expand its international air network in Western Europe and the non-Communist countries in Asia. Success seems assured if the USSR maintains its recently shown amenability to abide by international customs in its air agreements and is permitted to exploit the intense rivalry that characterizes the air industry of the Free World.

Glaring deficiencies continue to plague the Soviet civil air system, and a strict comparison shows that Aeroflot operates at standards far below those of US airlines. This situation is not, however, a serious complication for an air carrier which is not dependent on profits for its existence and which has ready access to state subsidy. Every effort will be made in the extension of Aeroflot's service to achieve at least a middle-term to long-term profit position, but the profit motive becomes illusory when the objectives are political rather than commercial. Thus, with no financial accounts to balance, the USSR can compete for influence in civil aviation in the underdeveloped areas of the Middle East and Asia; can challenge the aircraft industries of the US, the UK, and France in markets which they long have dominated; and, by virtue of its singular geographic location and the position of Aeroflot outside IATA, can establish the Soviet airline as a strong contender for international air traffic.

APPENDIX A

METHODOLOGY

The methodology employed in estimating traffic performance and length of network of civil aviation in the USSR was to accept absolute values announced by Aeroflot for certain base years (generally prewar) and to apply to these values the percentage increases given for subsequent periods. Where data were not available for any given year, estimates were derived by examination of past and present trends. Analysis of the 1957 summer schedule of Aeroflot yielded a great deal of information on utilization of aircraft and on operational efficiency.

To provide a standard for evaluating the performance and characteristics of Soviet civil aviation, frequent comparisons were made with aggregate data on scheduled US airlines, which are among the most efficient in the world. The statistical data on Soviet civil aviation, although not precise, are believed to be in the correct magnitude. The estimated general margin of error of plus or minus about 10 to 15 percent is not large enough to invalidate any comparisons with US experience.

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